BACT/ALERT® 3D 60

Service Manual

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Fig. 208 - Instrument Status Code 710 ..... D-9

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0.4 TYPOGRAPHY AND GRAPHIC CONVENTIONS

The following is a comprehensive list of the typographical and graphic elements of this manual.

0.4 TYPOGRAPHY AND GRAPHIC CONVENTIONS XIX

0.4.1 Bullets xxi
0.4.2 Text Boxes xxi
0.4.3 Bracketed Italics xxi
0.4.4 Underlined Text xxi
0.4.5 Bracketed Text xxii
0.4.6 Text Within Quotation Marks xxii
0.4.7 Italicized (Whether Bold or Not) Text xxii

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0.4.1 Bullets

Bullets are used to designate items in a list (•, -) or steps in a procedure (1, 2, etc)

0.4.2 Text Boxes

Important Steps

A text box can be a **NOTE**, **CAUTION**, **WARNING** or Image Note.

Fig. 1 - Text Box

Whenever text is contained within a box (Reference Figure 1) it identifies things that require special attention. There are three different text boxes used within this manual:

- NOTES: Used to clarify or explain a particular step. These text boxes are identified by the word **NOTE**' (bold and all caps) centered at the top of the box and normal text following.
- CAUTIONS: Used to identify actions that could cause DAMAGE to the instrument or test equipment. These text boxes are identified by the word '**CAUTION**' (bold and all caps) centered at the top of the box and bold text following.
- WARNINGS: Used to identify actions that could result in INJURY or DEATH to personnel performing the procedure (or close by). These text boxes are identified by the word '**WARNING**' centered at the top of the box and bold capitalized text following.
- IMAGE NOTES: Used to explain steps of a process, identify component parts, suggestions and other steps related to the functionality of the instrument. The text boxes are not identified with any special markings. Generally they will surround photos and drawings and will explain processes, parts or other related information.

0.4.3 Bracketed Italics

Brackets around Italics text, *[Italics Text]*, identifies items to be clicked on the display screen. (I.E.: **Press** *[On Line]* to continue).

0.4.4 Underlined Text

Underlined text identifies words, groups, or characters that are to be typed on the keyboard. (I.E.: **Type** <Y><E><S> to continue, or **Press** <ALT> + <CTRL> + <DEL> to reboot.)

0.4 TYPOGRAPHY AND GRAPHIC CONVENTIONS (CONTINUED)

0.4.5 Bracketed Text

Single text within brackets identifies single keys to be pressed on the keyboard. (I.E.: **Press** <Esc> to exit the system.)

0.4.6 Text Within Quotation Marks

Whenever text is displayed within quotation marks, it usually means that this a displayed message on the screen. (I.E.: After previous step is complete, the system will display '**Press** Any Key to Continue'.)

0.4.7 Italicized (Whether Bold or Not) Text

Whenever text is in *Italics* (*or* ***Bold Italics***), it provides for emphasis, or identifies key words or concepts. Whenever this format is seen, it is an important operative part of the meaning of the text or added notation. Bold Italics designate STRONG emphasis and is not to be ignored or taken lightly.

0.5 SAFETY SUMMARY

The following is a comprehensive list of the safety issues outlined in this chapter.

0.5 SAFETY SUMMARY XXIII

0.5.1 General Information to Follow xxv
0.5.2 Electrical Warnings xxv
0.5.3 Electrical Grounding xxvi
0.5.4 Fuse Replacement Warning xxvi
0.5.5 Hazardous Voltages xxvi
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0.5.7 Health Risks xxvii
0.5.8 ESD Precautions xxvii
0.5.9 Moving Parts xxvii
0.5.10 Heating Element xxvii

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0.5.1 General Information to Follow

This manual contains **WARNINGS**, **CAUTIONS** and **NOTES**, specific instructions and other information that must be followed and observed at all times. This will help ensure the safe handling and operation of the instrument.

- **NOTE:** ***Clarifies or explains*** a particular step or procedure. A note box is identified with the word **NOTE** in bold text and the explanatory body text is not bolded.
- **CAUTION:** *Warns of a risk of DAMAGING equipment or components*. A caution may be identified with the word CAUTION and its explanatory body text is bolded.
- **WARNING:** Identifies a process step that ***may cause injury or DEATH*** to personnel. A warning may be identified with the word WARNING and its explanatory body text is bolded in all caps.

0.5.2 Electrical Warnings

The BacT/ALERT 3D 60 has been designed and tested IAW IEC Publication 61010-1: *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use*, UL 3101-1, CAN/CSA C22.2 No. 1010.1-92 and has been supplied in safe condition. A CB Certificate and Construction File have been established for the instrument.

1. Before applying power, ensure that the Power Entry Module (PEM) is properly configured for the specific facility power voltage. Also ensure that the fuse(s) is (are) installed and of proper rating value. (See Subsection 3.2.5 – Set AC Power)
2. Any interruption of the protective conductor inside or outside of the instrument or disconnection of the protective earth terminal is likely to make the instrument dangerous to lab personnel and other users.
3. Any adjustment, maintenance or repair of the opened instrument while under voltage should be avoided. If power to the instrument is necessary, repair or maintenance shall be carried out only by a trained and qualified individual who is aware of the hazard(s) involved with the task. In addition, a second individual will be nearby to render aid, if necessary.
4. Make sure that only fuses with the required current rating and of the specified type are used for a replacement. The use of makeshift fuses or the short-circuiting of any fuse holder is extremely dangerous and prohibited. (See Subsection 3.2.5 – Set AC Power)
5. Whenever it is likely that a BacT/ALERT 3D 60 has been impaired, it will be made inoperative by powering it down and disconnecting the power cord. If there is evidence of moisture within the instrument, turn the facility power off at the circuit breaker junction box before removing the power cable. The instrument is likely to be impaired if it:
   - Shows visible damage
   - Fails to perform an intended operation
   - Has been subjected to storage or operation under unfavorable conditions. (i.e., above 80% humidity, dusty environment, prolonged storage. (Refer to Section 1-2, Table 1.2.1, for tolerances.
   - Has been subjected to severe transport stresses.
6. If any of the above conditions occur, a qualified service technician must check the instrument out prior to use.

0.5 SAFETY SUMMARY (CONTINUED)

0.5.3 Electrical Grounding

An electrical ground is required and must be in place for this instrument.

Before installing the instrument, ensure that a grounded wall receptacle is available for each unit. It must be plugged into a mating grounding type wall receptacle in accordance with National Electrical Codes (US Domestic) and/or applicable local codes and ordinances (domestic or international) for this type of installation. (Reference Figure 2, below)

WARNING

UNDER NO CIRCUMSTANCES IS THE GROUND PRONG TO BE REMOVED. IF THE GROUND PRONG, THE PLUG, OR THE CORD HAVE ANY PHYSICAL DAMAGE, THE CORD IS TO BE REPLACED. IT IS EXTREMELY HAZARDOUS TO OPERATE THIS (OR ANY) INSTRUMENT WITH A MISSING GROUND PRONG OR A FAULTY CABLE IN PLACE.

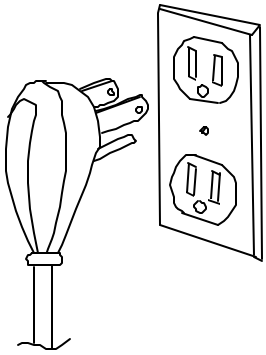

Fig. 2 - USA 115 VAC Standard

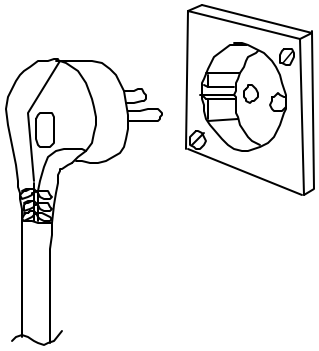

Fig. 3 - European 230 VAC Standard

0.5.4 Fuse Replacement Warning

There are no user-serviceable fuses in the BacT/ALERT® 3D 60. Only trained and qualified service technicians are to replace any fuse within the instrument. The only exception to fuse installation will be during the initial installation of the unit. At the time of installation, the customer does install PEM fuses according to steps outlined in the *Installation* section of the BacT/ALERT 3D 60 Operator's Manual.

0.5.5 Hazardous Voltages

DC voltages used within the instrument are low voltage and low current. They do not pose any immediate hazard to technicians. There is, however, facility power of either 115 VAC or 230 VAC within or near the power supply assembly, which *could* pose an electrical hazard if proper precautions are not observed. **Note:** All voltages are potentially hazardous under the proper circumstances.

0.5.6 Cleaning Agents

Follow manufactures' instructions and MSDS (Material Safety Data Sheets) information to prevent any possible hazards that may be present when using cleaning agents (or other chemicals).

0.5 SAFETY SUMMARY (CONTINUED)

0.5.7 Health Risks

Specimens and inoculated culture bottles are to be assumed as though they are capable of transmitting infectious agents. Handling of any bottles or specimens must be done with the utmost care. Spills must be cleaned as soon as possible, using the disinfection procedures outlined in the BacT/ALERT® 3D 60 Operator's Manual and Appendix C of this manual.

0.5.8 ESD Precautions

The BacT/ALERT® 3D 60 contains several electrostatic sensitive devices within the modules. Proper ESD precautions, in addition to the use of a grounding strap, are imperative *whenever working on or near* any ESD components.

0.5.9 Moving Parts

There are moving parts within the left side of the instrument's chassis. At times, personnel may be exposed to the Agitation Drive Arm, Motor Offset Round and other internal moving parts. Care must be taken to avoid exposure of clothing, hands, fingers, arms, etc. Prior to performing maintenance procedures around moving parts, it is advised that loose clothing (i.e. ties, long sleeves, etc.) be secured.

0.5.10 Heating Element

The instrument contains a heater to perform the incubation process. The heater *may remain hot for a period of time after the unit is first shut down for maintenance*. To prevent burns, avoid contact with the heater until it is known that it is cool enough to touch.

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CHAPTER 1
GENERAL INFORMATION

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1 GENERAL INFORMATION

This chapter describes the theory of operation and the general characteristics of the equipment.

1.1 INTRODUCTION

The following is a comprehensive list of the general descriptions of instrument components, operational reference data, subassemblies and operator display configurations.

1 GENERAL INFORMATION 1-1

1.1 INTRODUCTION..... 1-1

1.2 REFERENCE DATA..... 1-2

1.3 EQUIPMENT DESCRIPTION..... 1-3

1.4 ASSEMBLY DESCRIPTIONS..... 1-4

1.5 OPERATOR DISPLAY CONFIGURATION SCREENS..... 1-24

1.6 QUICK REFERENCE CARD..... 1-29

1.2 REFERENCE DATA

This chart represents the environmental conditions for use, including the physical, functional and technical characteristics of the BacT/ALERT 3D 60 instrument.

Electrical Power	
Service Required	100/120/220/240VAC @ 50/60Hz
Power Consumed	
In Watts	120VAC: 480W Max 240VAC: 480W Max
Heat Dissipated	
In BTU/hr	1639 BTU/Hr. Max
Equipment Characteristics	
Width	23.1 in. / 58.7cm
Height	23.9 in./ 60.7cm
Depth	19.9 in. / 60.5 cm
Weight	94 lbs. / 42.5Kg
Environmental Characteristics	
Operating Temperature Range	10°C - 30°C (50°F - 86°F)
Storage Temperature Range	17°C - 57°C (0°F - 135°F)
Operating and Storage Humidity Range	10% - 90% RH (non-condensing)
Operating and Storage Altitude	No restrictions

Table 1.2.1 – Combination Module Reference Data

1.3 EQUIPMENT DESCRIPTION

The BacT/ALERT® 3D 60 instrument is a compact and automated microbial detection system capable of incubating, agitating, and continuously monitoring specimens suspected of contamination from bacteremia / fungemia.

The instrument consists of a WinSystems CPU and one 60-bottle chamber consisting of three racks of 20 culture bottles each. An externally attached display monitor permits the operator to control and monitor the racks. (Refer to Figure 4, below)

Fig. 4 - BacT/ALERT 3D 60 Instrument

1.4 ASSEMBLY DESCRIPTIONS

The following paragraphs indicate the composition of the system, (i.e., the equipment, hardware, software and consumables required for it to operate.

1.4.1 Electrical Components

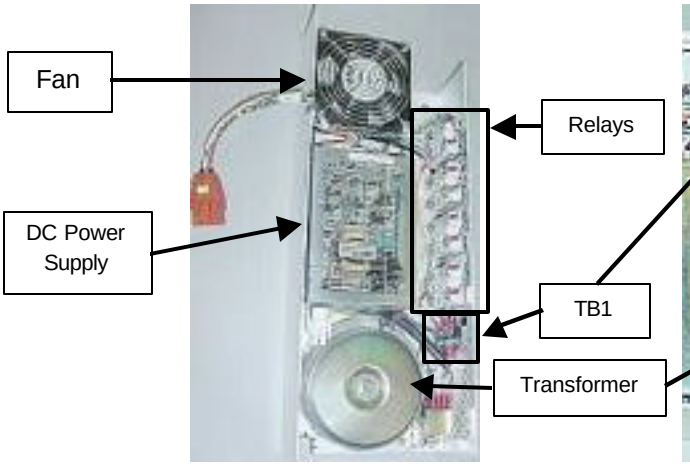

Fig. 5 - 3D 60 Power Panel Assembly

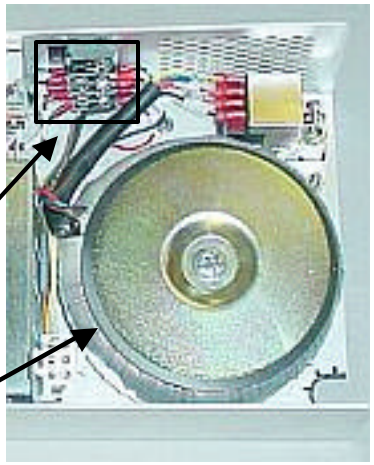

Fig. 6 - Transformer

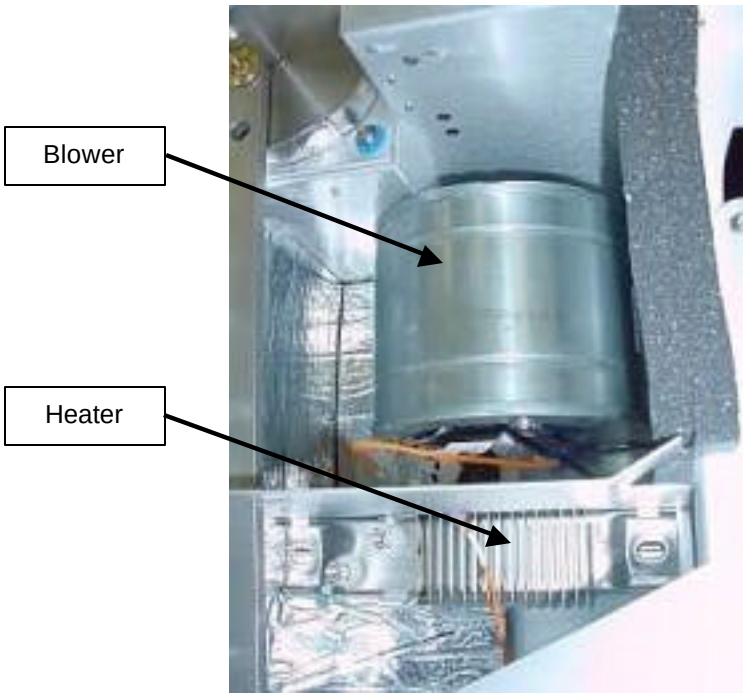

Fig. 7 - Blower & Heater

1.4.1 Electrical Components (Continued)

1.4.1.1 Power Panel Assembly

The BacT/ALERT® 3D 60 instrument uses a standard BTA cabinet power supply. The Power Panel Assembly provides the AC and DC power supply voltages that are used within the 3D 60. With the use of relays, this will also shut down incubation processes when instructed to do so by the ModSig PCBA. The power supply provides the four separate DC voltages (+ 5V and ±12V) used throughout the instrument. (Refer to Figure 5)

1.4.1.2 Transformer Assembly

This is a transformer to isolate the instrument from facility power and is installed on the System Power Panel. (Refer to Figure 6)

1.4.1.3 Heater

The heater provides the necessary heat for the incubation process of bottle cultures. (Refer to Figure 7)

1.4.1.4 Blower

For the incubation process, the blower circulates heat (produced by the heater) throughout the 3D 60 instrument. (Refer to Figure 7)

1.4.1 Electrical Components (Continued)

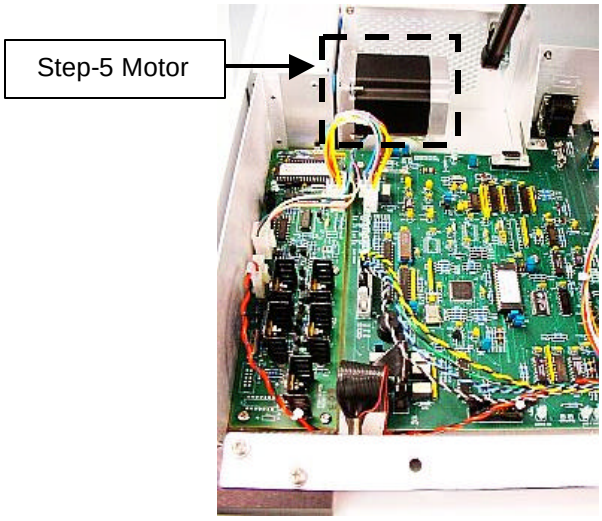

Fig. 8 - Step-5 Motor Assembly

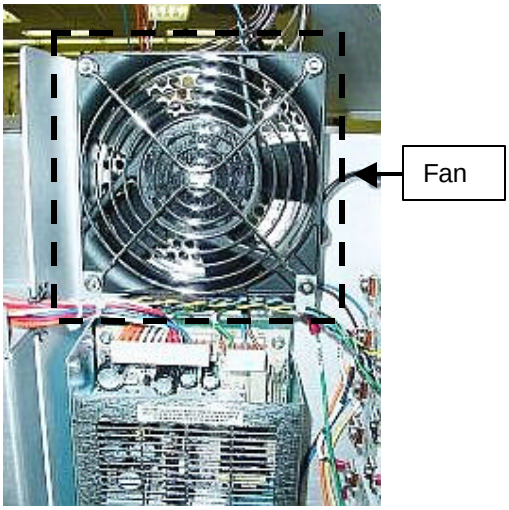

Fig. 9 - Fan Assembly

1.4.1 Electrical Components (Continued)

1.4.1.5 Step-5 Motor Assembly

This Step-5 Motor (Figure 8) provides agitation to the racks, unless the incubation chamber has been converted to MB and the motor has been disconnected to bypass this process. (Refer to Subsection 4.4.2, Figures 59, 60 and 61 for MB Conversion)

1.4.1.6 Fan

A fan circulates air over the electronic components within the Electronics Compartment to help prevent overheating. This fan may also be called the *E-Fan.* (Refer to Figure 9)

1.4.1.7 Quick Reference Card

This card identifies specific error codes and outlines instructions regarding system operation. Refer to Section 1.6, Figure 31 - Front Side and Figure 32 - Rear Side)

1.4.2 Communications Ports (Input / Output)

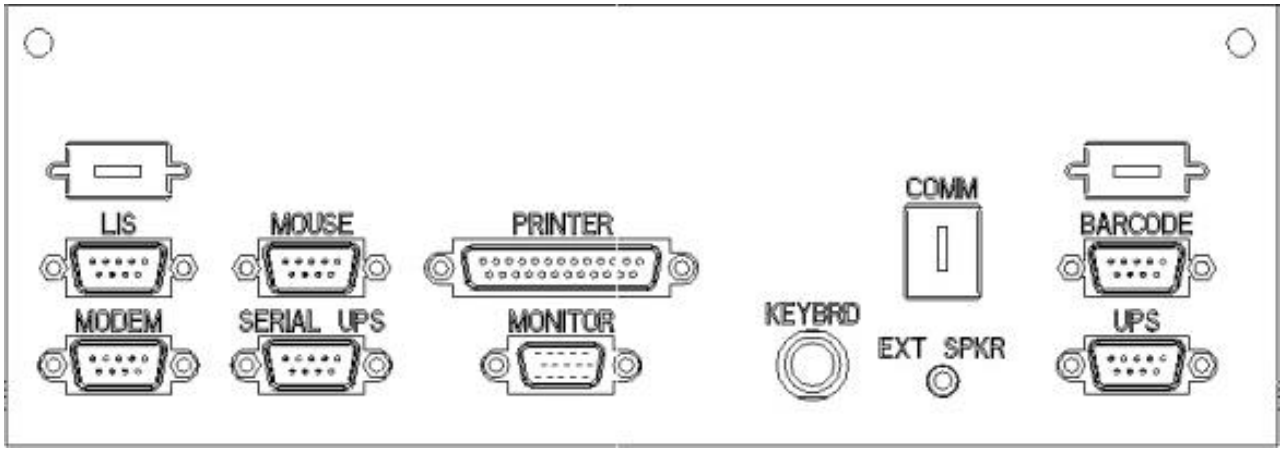

Fig. 10 - BacT/ALERT 3D 60 System Control (Rear View) w/Comm Ports

1.4.2 Communications Ports (Input / Output) (Continued)

The communications ports are input/output ports that peripheral devices connect to on the rear of the BacT/ALERT 3D 60 instrument. (Refer to Figure 10)

1.4.2.1 COMM Port

This port is reserved for future use.

1.4.2.2 Printer Port

A printer connects to this port via a parallel cable and produces hard copy reports.

1.4.2.3 Internal Speaker w/external Speaker Jack

The system has a remote speaker feature with a 5mm external mini-jack to drive two remote stereo speakers from a distance of up to 450 feet (see Remote Speakers P/N 880-0002-01 and 02, along with 100-ft. of speaker wiring, P/N 957-0004-350.

1.4.2.4 Power Entry Module (PEM) / **ON-OFF** Switch

The PEM contains the fuse protection for the unit when connected to main facility AC power. The PEM also houses the main power switch for the instrument.

1.4.2.5 Modem Port

Used to connect the BacT 3D 60 to an external modem.

1.4.2.6 LIS Port

This port is used for connection to the facility's LIS system.

1.4.2.7 Monitor Port

This port is used for connection to an external VGA or SVGA monitor.

1.4.2.8 UPS Port

Used to connect an external UPS to the instrument.

1.4.2.9 UPS Serial Port

Reserved for future use.

1.4.2.10 Mouse Port

Used for connecting the mouse to the instrument.

1.4.2.11 Keyboard Port

A port for connecting the keyboard to the instrument.

1.4.2.12 Barcode Scanner Port

Port for connecting the barcode-scanning wand to the instrument.

1.4.3 Electronic Components

CPU Board

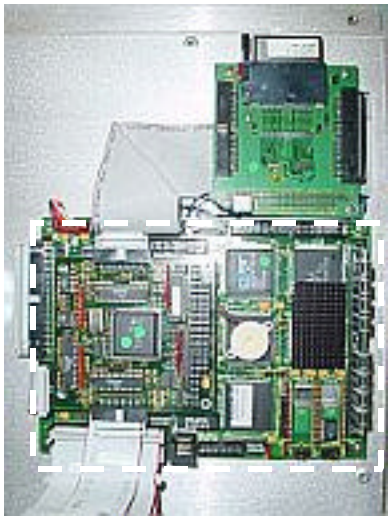

Fig. 11 - CPU PCBA

ModSig Board

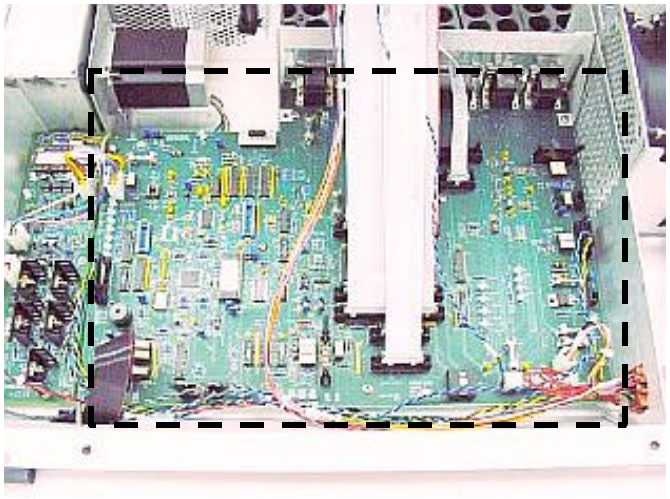

Fig. 12 - ModSig PCBA

Quad Serial Board

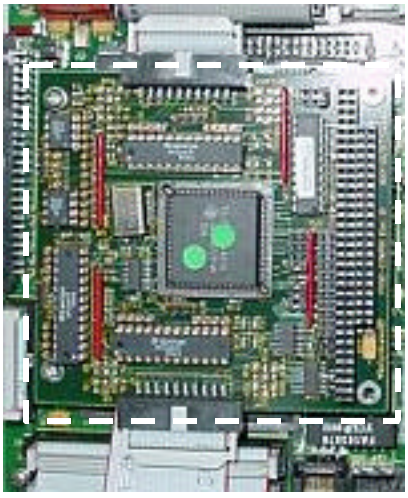

Fig. 13 - Quad Serial PCBA

Thermistor Board

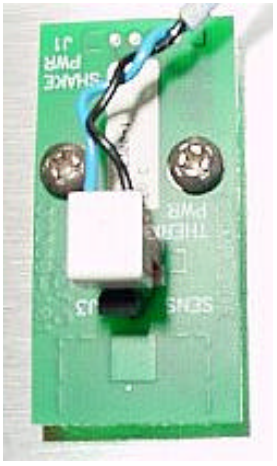

Fig. 14 - Thermistor PCBA

1.4.3 Electronic Components (Continued)

The Electronics Compartment is situated in the top part of the 3D 60 instrument. It contains the internal WinSystems® computer (CPU PCBA and Quad Serial PCBA), CompactFlash Adapter PCBA, Zip™ Drive, Step-5 PCBA and the ModSig PCBA.

1.4.3.1 CPU PCBA

The CPU is a 586 processor with an operating clock speed of 133MHz. This is the heart of the system and controls all system operations. (Reference Figure 11)

1.4.3.2 ModSig PCBA

This board provides an interface between the CPU PCBA and the rest of the system. It serves as a module controller for the system PCBAs, monitors incubation temperature and the external port devices (i.e., modem, scanner, LIS, etc.) that are attached to the 3D 60 instrument. It also monitors several independent system tasks such as DC voltages, switches, the frequency output of the speaker, power reset and other functions. (Reference Figure 12)

1.4.3.3 Quad Serial PCBA

This board provides the communications interface from the WinSystems® computer to the rest of the system (incubator). (Reference Figure 13)

1.4.3.4 Thermistor PCBA (Input/Output)

There are two Thermistor PCBAs. One is the Input Thermistor and the other is the Output Thermistor. The Input Sensor measures the air temperature from the warmer air circulated by the heater fan and the Output Sensor the temperature of the cooler air measured after Incubator Chamber circulation. A reading is taken from each sensor and the average temperature reading of the two comprise the Incubator Chamber's temperature used by the temperature control logic. (Refer to Figure 14)

Note: The Input and Output Thermistors are not components of the Electronics Compartment, yet they are described as integrated PCBAs of the electronic system. The thermistors boards are installed in the lower compartment of the left and right inside chassis, respectively.

1.4.3 Electronic Components (Continued)

Fig. 15 - CompactFlash Memory Disk

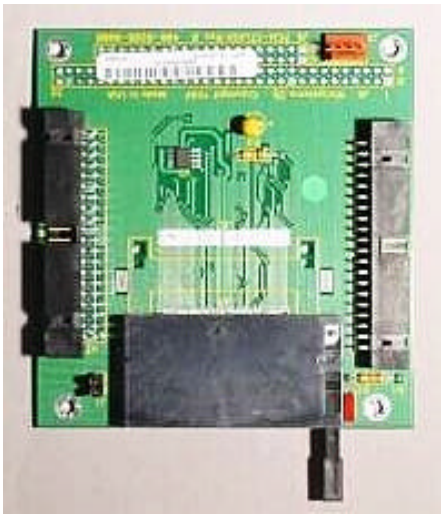

Fig. 16 - CompactFlash Adapter PCBA

NOTE: Flash memory disk above may not necessarily reflect the actual memory disk or size being used in the 3D 60 instrument.

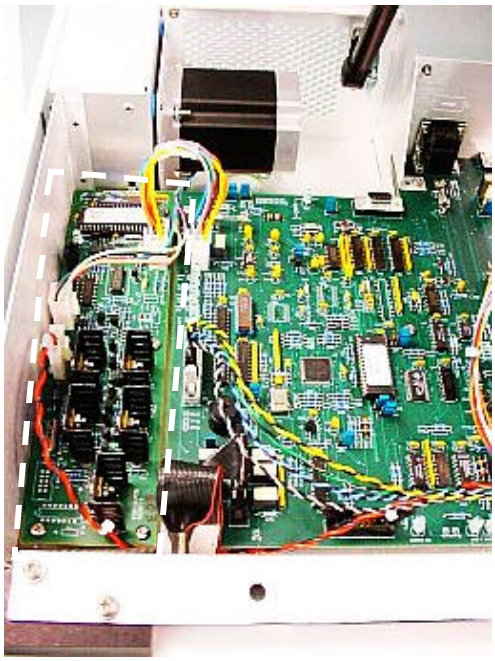

Fig. 17 - Step-5 PCBA

1.4.3 Electronic Components (Continued)

1.4.3.5 CompactFlash Memory Disk

This CompactFlash disk is a removable mass storage device installed on the CompactFlash Adapter PCBA. It is a device about the size of a matchbook and weighs about one-half ounce. Since it is a solid-state device utilizing flash memory, it contains no moving parts and requires no battery for data retention. The CompactFlash Disk is compatible with IDE/ATAPI standards and serves as the **C:** drive in the BacT/ALERT 3D 60 application, where it holds the operating program, bottle records, system configurations, event log files and miscellaneous other information needed for BacT/ALERT operation. (Refer to Figure 15)

1.4.3.6 CompactFlash Adapter PCBA

The PCM-CFLASH PCBA (Reference Figure 16) is a PC/104 compatible adapter module, designed specifically to adapt CompactFlash memory disks for use in embedded systems such as the BacT/ALERT 3D 60. The adapter provides for master/slave selection and a visual drive status indicator. The CompactFlash Adapter PCBA is installed on the top cover of BacT/ALERT 3D 60 system.

1.4.3.7 Step-5 PCBA

The Step-5 controller board (Reference Figure 17) is designed to drive a five-phase stepper motor at the speed of 60 revolutions per minute. The board operates with input voltages of +5V and +12V, drives the stepper motor directly, and provi des starting and stopping functions based on inputs received from the ModSig PCBA.

1.4.3 Electronic Components (Continued)

Fig. 18 - BacT 3D 60 Incubator Chamber

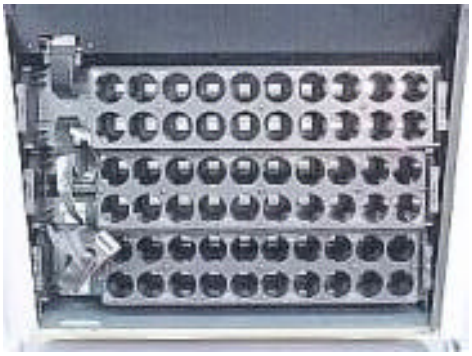

Fig. 19 - Rack Assembly

1.4.3 Electronic Components (Continued)

1.4.3.8 Incubator Chamber Components

The Incubation Chamber (Reference Figure 18) contains three specimen racks, relays, power supply, ModSig PCBA, rack controller PCBAs, heater and blower. As viewed by the operator, the bottles are loaded into the front of the 3D 60 instrument.

1.4.3.8.1 Rack

Each rack contains 20 bottle cells. Unless the instrument is designated as an MB unit, the racks are continuously rocked (to provide agitation for the specimen bottles). Also, three fascia plates identify the bottle locations and are <u>not</u> interchangeable between replacement racks. (Refer to Figure 19)

1.4.3.8.2 Cell

There are 60 cells per instrument, with cells identified as 1 through 20 in the first (top) rack, 21 through 40 in the middle rack and 41 through 60 in the bottom rack.

1.4.3.8.3 Cell Flag

The cell flag serves as a clip securing the bottles into their cells. The cell flag is also a key component in bottle detection and cell diagnostics.

1.4.3.8.4 Cell Indicator Lamp

A lamp is located next to each cell and provides feedback to the operator. Depending on the function selected by the operator, illuminated lamps identify the positions of positive or negative bottles, cells that can be loaded, and so on. A flashing indicator lamp indicates an operator error.

1.4.4 Input / Output Devices

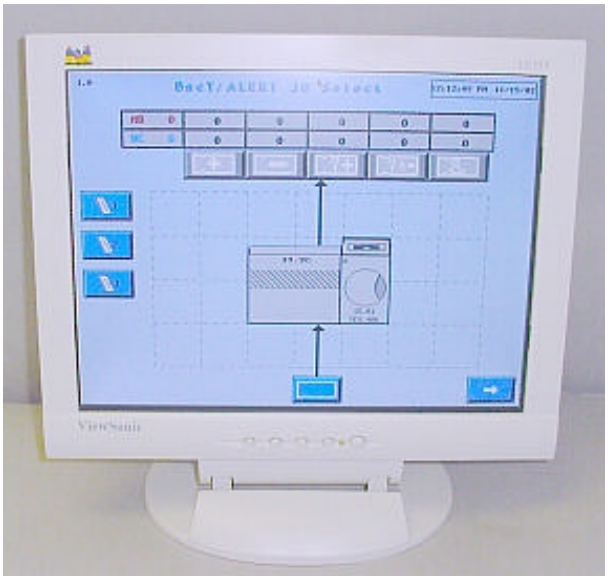

Fig. 20 - Operator Display Monitor

Fig. 21 - Barcode Scanner

Note: The figure above shows a flat panel monitor and may not represent the model or type of monitor actually shipped with the 3D 60 instrument.

Fig. 22 - Keyboard

Fig. 23 - Zip Drive

NOTE
The photos of output devices shown above may not necessarily reflect the models being installed.

1.4.4 Input / Output Devices (Continued)

1.4.4.1 Operator Display Monitor

The display monitor is a standard VGA monitor used for displaying diagnostic and module setup information. (Reference Figure 20)

1.4.4.2 Barcode Scanner

The QuickScan™ 6000 Barcode Scanner scans bottle labels, identifying the bottles whenever loading or unloading. (Reference Figure 21)

1.4.4.3 Keyboard

This is a standard-sized 101-key keyboard. It is used as an alternative input device to the barcode scanner or mouse. (Reference Figure 22)

1.4.4.4 Zip Drive

This drive provides an internal resource for loading new operating system software and performing system data backup. (Reference Figure 23)

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1.4.4 Input / Output Devices (Continued)

1.4.4.5 56K FAX Modem (Domestic)

The fax modem serves as an interface to the BacT 3D 60 instrument for remote access. The remote user is able to download and upload information, including seeing what is on the display-screen that the local operator views. The Technical Support Center is able to perform remote diagnostics and other troubleshooting of the instrument.

The modem interfaces the 3D 60 instrument through a connection to the **Modem** port on the rear of the unit. Digital signals are converted to tones by the modem for sending to the telephone system through the telephone jack connection and to a remote modem at on the receiving end. Conversely, tones from the remote modem are converted to digital signals and sent to the instrument through the **Modem** port. Power for the modem is supplied by a wall-mounted power supply that supplies low voltage required by the modem. The wall-mounted power supply plugs directly into a standard electrical outlet.

1.4.4.6 56K Fax Modem (International)

The international fax modem differs slightly from the domestic version, by having CE markings and is shipped with a 220V AC adapter. It also has two additional DIPswitch settings (9 & 10). (See Subsection 3.2.12, Figure 53, for instructions on International Fax Modem DIP switch settings.

The fax modem serves as an interface to the BacT 3D 60 instrument for remote access. The remote user is able to download and upload information, including seeing what is on the display-screen that the local operator views. The Technical Support Center is able to perform remote diagnostics and other troubleshooting of the instrument.

The modem interfaces the instrument through a connection to the **Modem** port on the rear of the unit. Digital signals are converted to tones by the modem for sending to the telephone system through the telephone jack connection and to a remote modem at on the receiving end. Conversely, tones from the remote modem are converted to digital signals and sent to the instrument through the **Modem** port. Power for the modem is supplied by a wall-mounted power supply that supplies low voltage required by the modem. The wall-mounted power supply plugs directly into a standard electrical outlet.

1.4.5 Uninterruptible Power Supply "UPS"

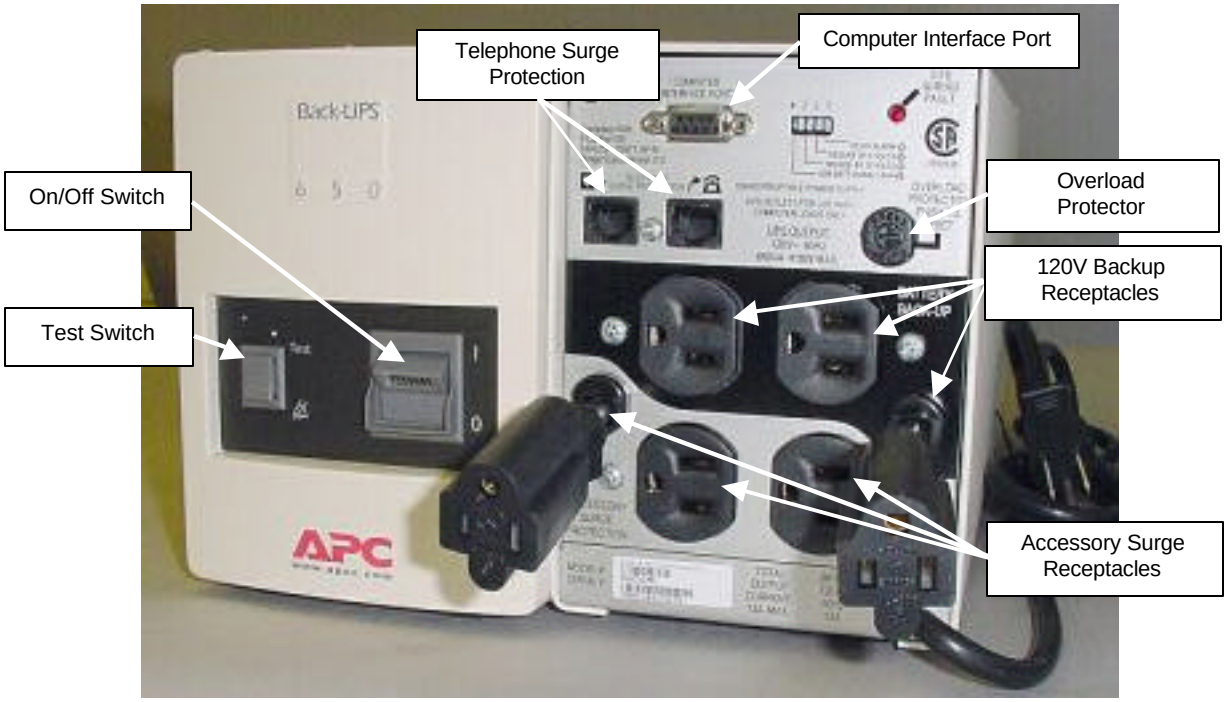

Fig. 24 - Uninterruptible Power Supply (UPS) Domestic Model – Front and Rear Views

1.4.5 Uninterruptible Power Supply "UPS" (Continued)

Refer to Figure 24 for the following component descriptions of the domestic UPS.

1.4.5.1 On/Off Switch

Turns the UPS and BacT/ALERT 3D 60 unit **ON** and **OFF** from the UPS.

1.4.5.2 UPS Comm Port (Computer Interface Port)

The UPS Computer Interface Port is a standard 9-pin port used to connect a cable that monitors communications between the UPS and the 3D 60 Instrument. (The port connection is shown as *Computer Interface Port* in Figure 24)

1.4.5.3 Overload Reset Switch

The Overload Switch is a reset switch (breaker) allowing for UPS reset following a power surge or uncommon UPS shutdown. The overload is rated 120VAC, 12 Amp (Max) at 50/60Hz.

1.4.5.4 Test (Check Battery/Alarm Disable) Switch

By pressing the top of *Test* (toggle) switch, the UPS battery may be checked. The UPS powers the loads from the battery. If the UPS emits the battery exhaustion alarm, the battery is weak and requires extended charge or replacement.

1.4.5.5 120V Backup Receptacles

These 120V AC receptacles are used when devices connected to the UPS require full battery backup to allow proper shutdown of the equipment. A device that may require such battery backup might be the Display Monitor, since it is required to shut down the 3D 60 instrument in a "facility power-fail" situation.

1.4.5.6 Accessory Surge Receptacles

These 120V receptacles are used when devices connected to the UPS do not require battery backup but may require voltage surge protection. A device that may require surge protection but not battery backup might be a Parallel Printer.

1.4.5.7 AC Power Cord

The AC Power Cord is a standard three-pronged AC (grounded) cord.

1.4.5 Uninterruptible Power Supply "UPS" (Continued)

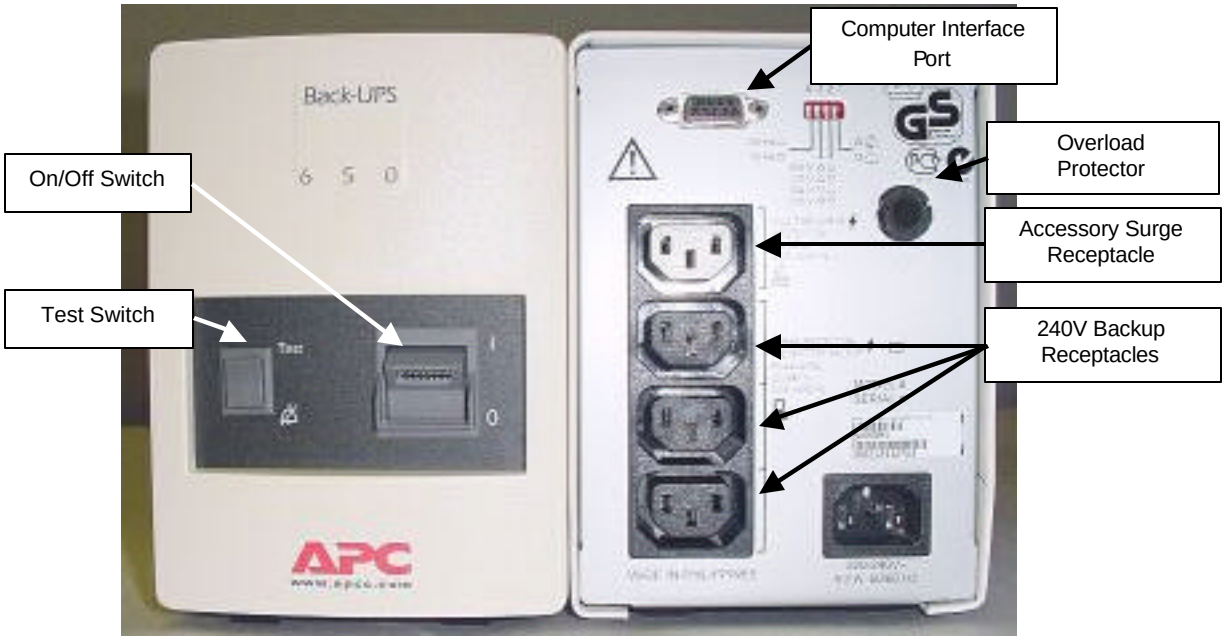

Fig. 25 - Uninterruptible Power Supply (UPS) European Model – Front and Rear Views

1.4.5 Uninterruptible Power Supply "UPS" (Continued)

The European UPS model is very similar to the US domestic model. The voltage rating, power cord and fuse ratings, however, are for the European power conversions. (Refer to Figure 25 for International/European UPS components)

1.5 OPERATOR DISPLAY CONFIGURATION SCREENS

Fig. 26 - Instrument Configuration Screen

1.5 OPERATOR DISPLAY CONFIGURATION SCREENS (CONTINUED)

The BacT/ALERT 3D 60's Operator's Manual describes most of the screens displayed on the display monitor. Specifically, it describes the screens used to: load/unload bottles, set the date and time, enable/disable cells, calibrate incubation temperature, perform single cell calibration, set maximum test times, set audible alarm options and change passwords. For detailed information on these screens, refer to the BacT/ALERT 3D 60 Operator's Manual.

1.5.1 Instrument Configuration Screen

This screen is primarily used when an instrument is being installed. It allows the field service engineer to enter information regarding rack installation. (Refer to Figure 26)

1.5.1.1 Accessing the Configuration Screen

Perform the following steps to gain access to the Configuration Screen:

1. At the "Main Screen", **click** on the [*Next Screen*] button (Refer to Figure 27, below)

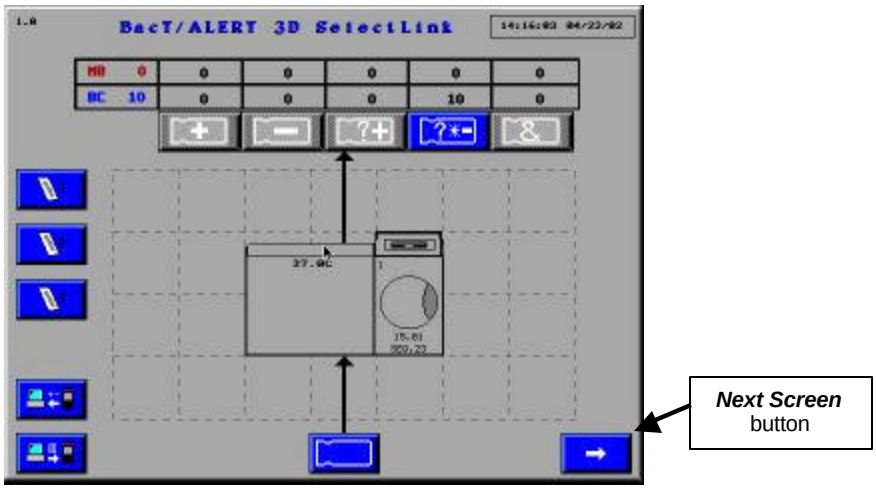

Fig. 27 - Main Screen

2. Once at the "Setup Screen" (Refer to Figure 28), enter the Field Engineer password **<4><3><4><3><2><1><2><1>**, by **clicking** on the number buttons at the top of the screen. After entering the password, click on the [***Key***] button. (See "Setup Screen" on the next page for Screen Diagnostics).

1.5.1.1 Accessing the Configuration Screen (Continued)

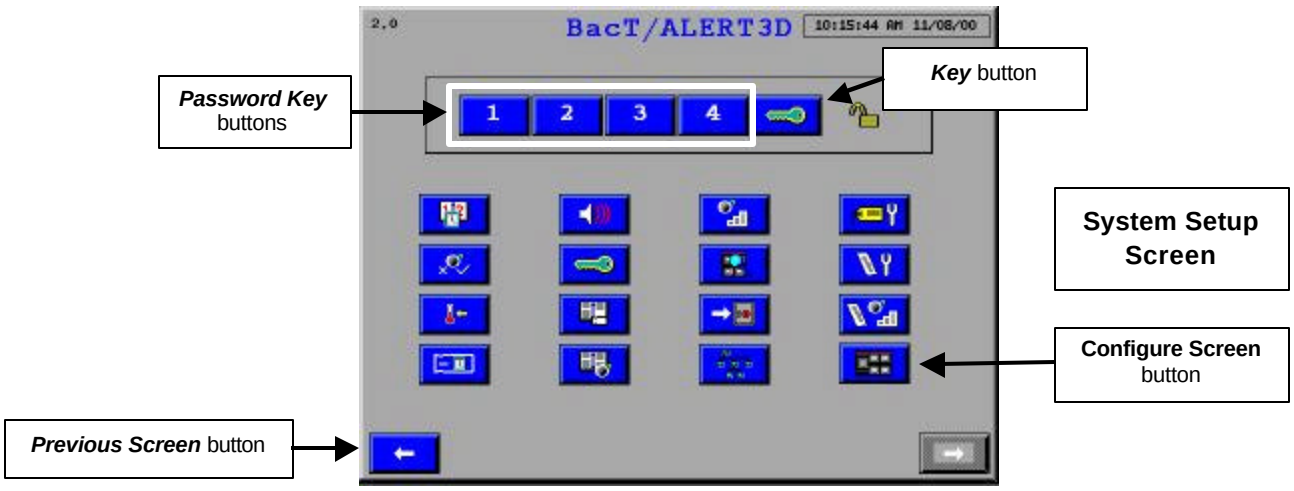

Fig. 28 - Setup Screen w/Field Engineer Password Activation

Clicking on the [*Configure Screen*] button will access the "Configuration Screen".

NOTE
To get back to the Main Screen,
press the [*Previous Screen*] button.

1.5.1.2 Instrument Configuration Screen - Initial Entry

Use this screen to configure the instrument. (Refer to Figure 29, below.)

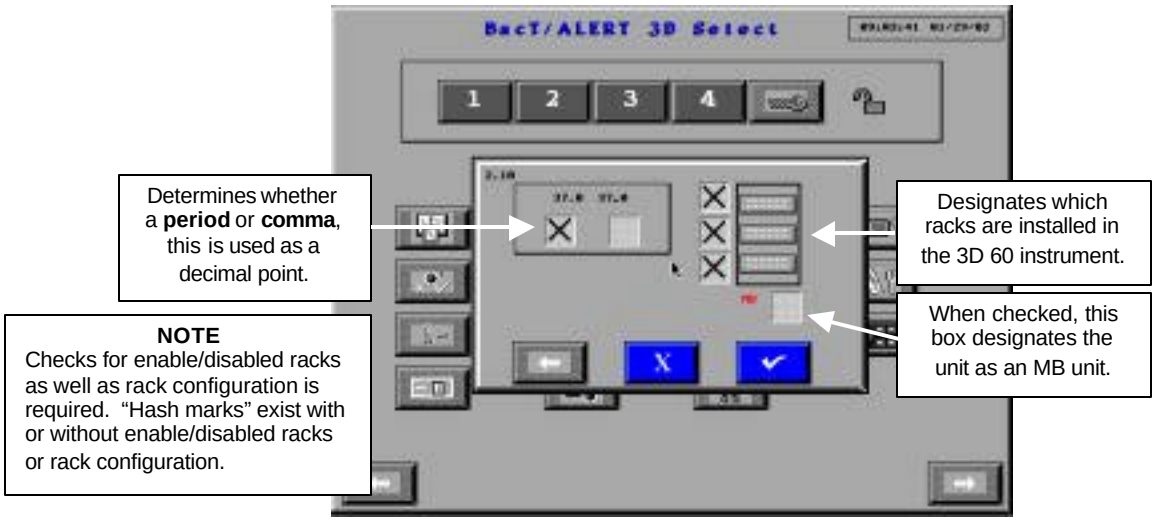

Fig. 29 - Instrument Configuration Screen

1.5.1.3 Configuration Screen [*X Box*] Buttons

Several configuration options are represented by a graphical element called an [*X Box*] button. As shown in Figure 30 below, an [*X Box*] button can appear with or without an "X" in the box. The "X" determines the active selection. Clicking inside the box with the mouse switches the box to the opposite state.

Fig. 30 - [*X Box*] Selection Checkbox

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1.6 QUICK REFERENCE CARD

The Quick Reference Card (Figure 31 and Figure 32 on the following pages, Front and Rear Sides, respectively) is simply that…a quick reference. The card contains references to errors and fault codes that may appear on the BacT/ALERT® 3D 60 during operation. The card's purpose is to aid the operator in determining what may have caused a particular problem. *It does not contain corrective action measures*. For more information, refer to Appendix D – Error Codes of this manual and the BacT/ALERT® 3D 60 Operator's Manual for possible solutions.

1.6 QUICK REFERENCE CARD (CONTINUED)

Card P/N 955-0500-03 Rev A

OPERATION ERROR CODES

Refer to Operator Manual for detailed error description and troubleshooting instructions.

Code	Description	Code	Description
901	CORRUPTED BOTTLE RECORD HAS BEEN SELECTED	932	BOTTLE ID SCANNED MATCHES THAT OF A PREVIOUSLY UNLOADED BOTTLE
902	REQUIRED DATA MISSING		
910	INVALID CELL LOAD	940	BOTTLE DETAIL NOT FOUND
911	INVALID CELL UNLOAD	941	BOTTLE ID ENTERED MATCHES THAT OF A BOTTLE THAT IS CURRENTLY LOADED IN A DIFFERENT CELL
912	INVALID CELL RELOAD		
913	BOTTLE ID JUST SCANNED MATCHES THAT OF A CURRENTLY LOADED BOTTLE	942	BOTTLE TYPE CHANGE REQUIRES DIFFERENT ALGORITHM
		943	IDENTIFIED BOTTLE CHANGED TO ANONYMOUS
921	BARCODE SCAN NOT ALLOWED IN THIS MODE	944	MANUAL UNLOAD OF ANONYMOUS BOTTLE
923	INVALID BARCODE ENTRY	945	BOTTLE ID ENTERED MATCHES THAT OF A PREVIOUSLY UNLOADED BOTTLE
930	INCORRECT OR UNEXPECTED BARCODE SCANNED AFTER UNLOADING A BOTTLE	960	DUPLICATE ENTRIES
		961	INVALID BLANK FIELD
931	DETECTION ALGORITHM HAS BEEN CHANGED		

SEE REVERSE FOR INSTRUMENT FAULT CODES

Fig. 31 - Quick Reference Card - Front Side

Detailed error descriptions and troubleshooting instructions may also be found in Appendix D of this manual.

1.6 QUICK REFERENCE CARD (CONTINUED)

INSTRUMENT FAULT AND STATUS CODES

Refer to Operator Manual for detailed error description and troubleshooting instructions.

Code	Description	Code	Description
1	POWER FAULT IN INCUBATION MODULE	60	CELL FAILED QC
2	COMMUNICATION LOST WITH INCUBATION MODULE	62	ERRONEOUS CELL LOAD STATUS REPORTED
3	INCUBATION MODULE TEMPERATURE IS TOO HIGH	71	INVALID TIME STAMP
4	INCUBATION MODULE TEMPERATURE IS TOO LOW	72	INVALID CALCULATION DATA
5	INCORRECT INCUBATION MODULE CONNECTION	73	INVALID METHOD DATA
10	CONTROLLER MODULE POWER FAULT	74	ALGORITHM CHANGE
11	INSUFFICIENT CHARGE IN UPS	75	BOTTLE DATA CORRUPTED
12	LIS COMMUNICATION FAULT	77	READING POLYNOMIAL CHANGE
19	SOFTWARE EXCEPTION	78	INCOMPLETE TEST DATA
20	DRAWER OPEN FOR TOO LONG	79	BOTTLE RELOADED VIA WRONG CONTROLLER
21	DRAWER AGITATION FAILURE	99	BOTTLE LOADED IN A NON-OPERATIONAL CELL
22	UNEXPECTED DRAWER AGITATION	710	INCUBATION MODULE TEMPORARILY UNAVAILABLE WHILE POWER UP INITIALIZATION TAKES PLACE
39	RACK TEMPERATURE FAULT		
41-47	RACK(S) NOT RESPONDING	800	PRINTER FAULT
51-57	RACK HARDWARE FAILURE	810	BACKUP FAILED

SEE REVERSE FOR OPERATOR ERROR CODES

Fig. 32 - Quick Reference Card - Rear Side

Detailed error descriptions and troubleshooting instructions may also be found in Appendix D of this manual.

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CHAPTER 2
BACKGROUND INFORMATION

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2 BACKGROUND INFORMATION

2.1 INTRODUCTION

The following is a comprehensive list of items outlined in this chapter. Included are the system PCBAs and the function of each, as well as the Incubation Chamber and Power Supply.

2 BACKGROUND INFORMATION 2-1

2.1 INTRODUCTION 2-1

2.2 SYSTEM CONTROL - MODSIG PCBA 2-2

2.3 THERMISTOR PCBA (INPUT/OUTPUT) 2-6

2.4 3D 60 POWER SUPPLY ASSEMBLY 2-8

2.5 DC POWER SUPPLY 2-10

2.6 CPU PCBA 2-12

2.7 COMPACTFLASH ADAPTER PCBA 2-14

2.8 QUAD SERIAL INTERFACE PCBA 2-16

2.9 RACK CONTROLLER PCBA 2-18

2.10 STEP-5 PCBA 2-24

2.2 SYSTEM CONTROL - MODSIG PCBA

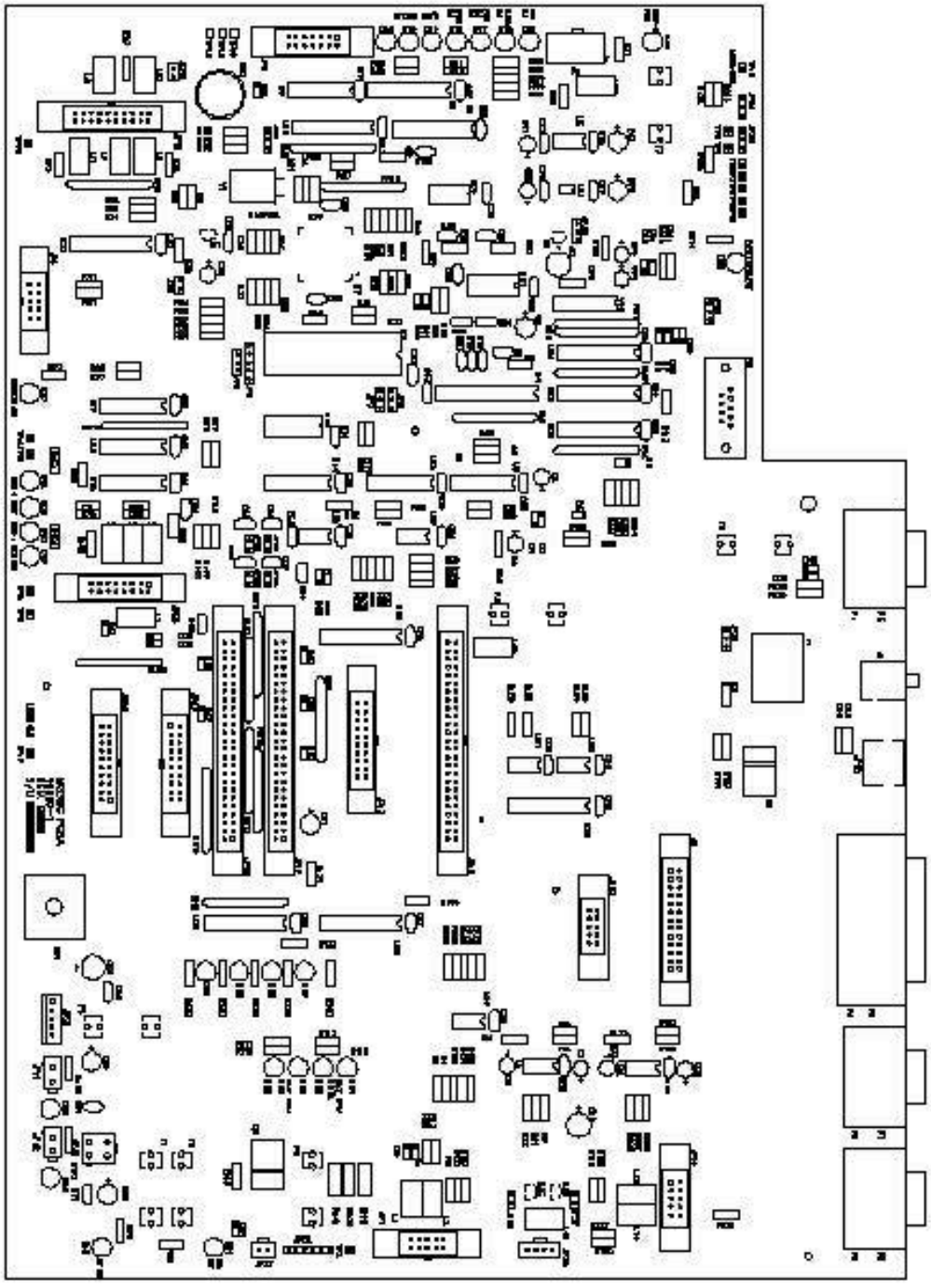


Fig. 33 - ModSig PCBA Diagram

2.2 SYSTEM CONTROL - MODSIG PCBA (CONTINUED)

The MODSIG PCBA provides interfaces to the 3D 60 Instrument Controller section, the Step-5 board, external peripherals and the Rack PCBA's. It uses a 68HC11 microprocessor with firmware stored in the EPROM. The microprocessor uses an external 16 MHz crystal for its clock. 32Kbytes of EPROM and 32Kbytes of static RAM are external, with no internal ROM. There are 512 bytes of EEPROM and 1024 bytes of RAM, both of which are internal.

A 4.5-volt reference is on the PCBA for A/D reference and a 2.5-volt reference for temperature control. Power-fail circuitry detects if the +5VDC is out of tolerance. LED's on the board show E Fan ON, Power-Enable ON, Blower ON, Heater ON, Agitation ON, +5V ON for ModSig, +5V ON for Step-5 PCBA, +5V ON for Racks, Door Switches Closed, six status indicators and RS-485 transmit and receive indicators.

Temperature sensors on the board are used for E-Fan control and to report electronics over-temperature conditions. External input and output temperature sensors are used by PID control firmware on the microprocessor for incubation temperature control and are connected to JP1. Heater, blower and fan ON/OFF time control signals connect through a connector at JP2. A 12-bit, 8-channel A to D converter integrated circuit does conversion from analog values to digital values for microprocessor use.

The front door has two separate interlock switches. These connect to the MODSIG PCBA through JP11 and JP12. One switch, which the firmware cannot override, functions as a safety interlock that disables the heater and blower if the door should open. The second switch is for logic functions and redundancy. Both switches are monitored by the firmware and by the Step-5 agitation motor control firmware.

An instrument ID thumbwheel switch, normally set to 1, is available if there should be a need to separately identify a 3D 60 at a customer's site.

A Piezo buzzer is provided as an audible alarm. A remote speaker system may be used, by connecting to J1. The keyboard connects to JP16. A barcode reader connects to P1 and a mouse connects to P2. A parallel port printer connects to P4. A LIS system is interfaces via P8 and a modem via P9.

JP13, JP15, JP17, JP18 and JP19 connect to the Instrument Controller CPU in the 3D 60. JP29 and JP30 are used for transferring serial data signals from the Quad Serial PCBA. The Serial UPS connector at P7 is for future use. The UPS is controlled through the connector at P5 and must be connected for proper system operation. The VGA display monitor is connected at P6. Five-volt power is connected to the board at JP31 and is supplied to the Zip Drive and the CompactFlash PCBA through JP21. Control and data signals for the racks are supplied through JP10.

Jumpers on the ModSig PCBA control the audio frequencies supplied to the remote speakers. The remote speakers control volume. Volume jumpers on the board are for future use only. See Table 2.2.1 for remote speaker audio frequency selections.

2.2 SYSTEM CONTROL - MODSIG PCBA (CONTINUED)

FREQUENCY	JP23	JP24	JP25	JP26
600 Hz	In	In	In	In
800 Hz	In	In	In	Out
1 KHz	In	In	Out	Out
1.5 KHz	In	Out	Out	Out
3 KHz	Out	Out	Out	Out

Table 2.2.1 - Audio Frequency Selection (JP23 through JP26)

2.2 SYSTEM CONTROL - MODSIG PCBA (CONTINUED)

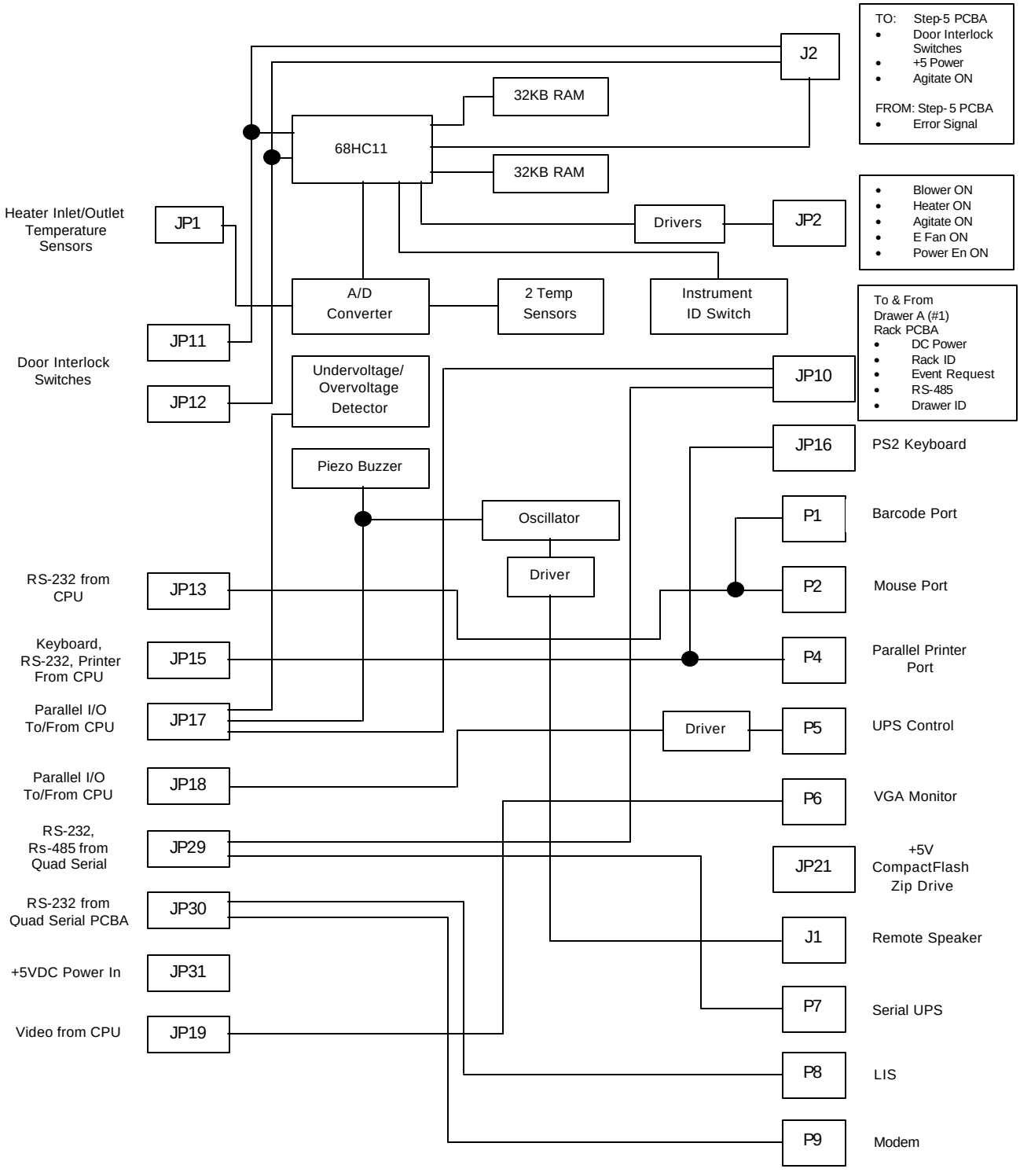


Fig. 34 - ModSig Block Diagram

2.3 THERMISTOR PCBA (INPUT/OUTPUT)

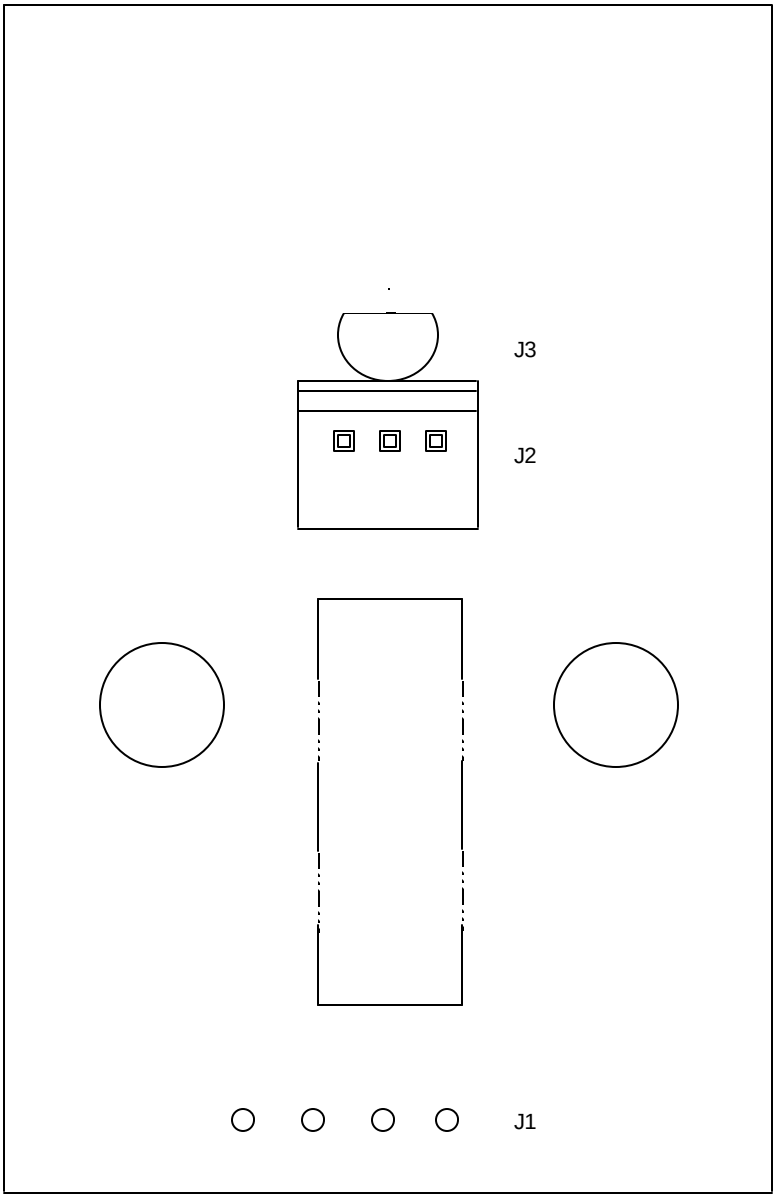


Fig. 35 - Thermistor PCBA

2.3 THERMISTOR PCBA (INPUT/OUTPUT) (CONTINUED)

The Thermistor board uses an Analog device AD592BN temperature transducer to produce a current flow proportional to temperature. The voltage source is +9VDC. The temperature transducer has a nominal flow of 298.2µa+ 25º C.

There are two Thermistors PCBAs in the 3D 60 instrument. The Input and Output Thermistors measure input and output air temperature, respectively. The Input and Output temperature readings are averaged together to comprise the Incubation Chamber's temperature used by the temperature control logic.

2.4 3D 60 POWER SUPPLY ASSEMBLY

Power Distribution Block Diagram

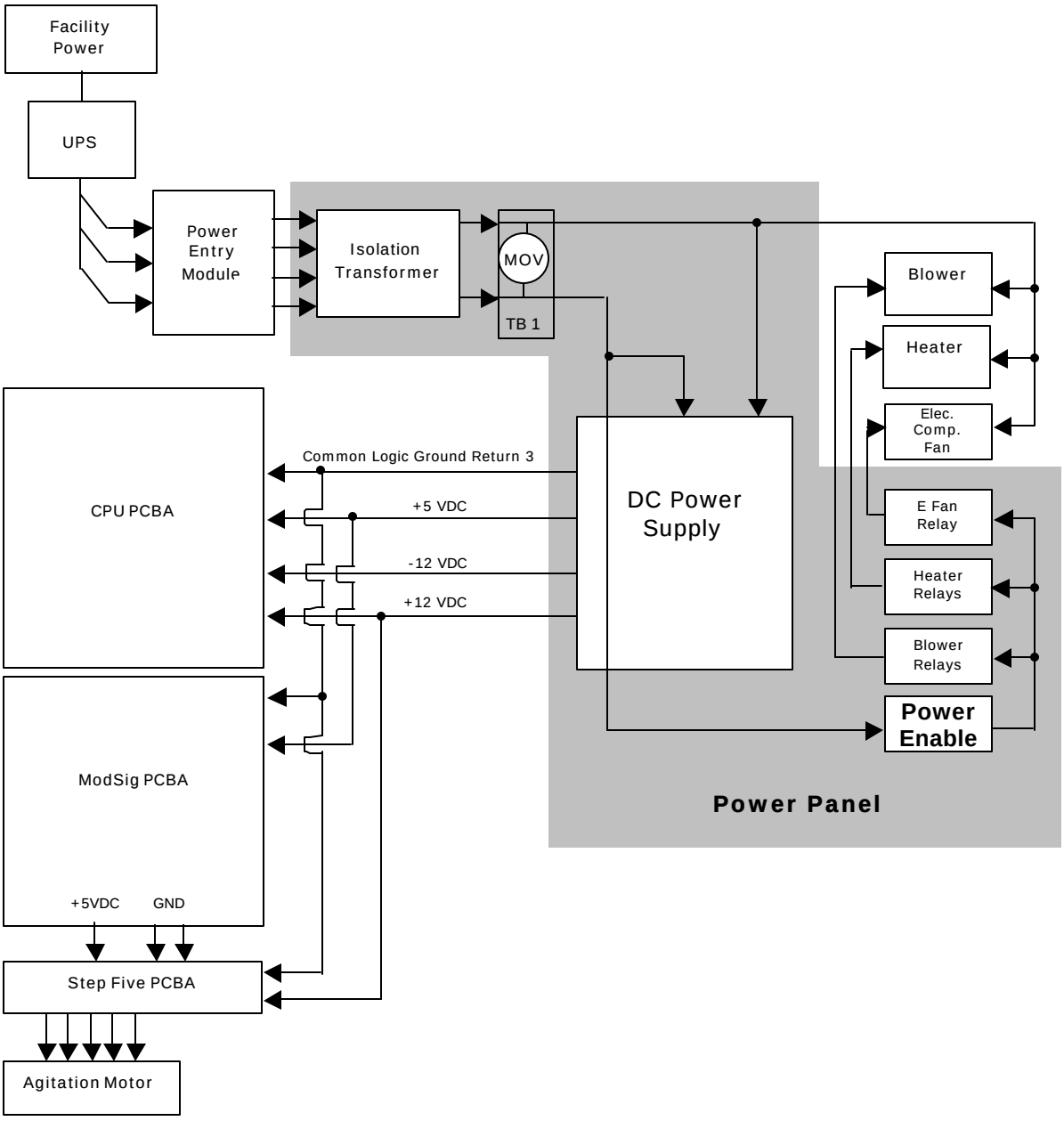


Fig. 36 - Power Distribution Block Diagram

2.4 3D 60 POWER SUPPLY ASSEMBLY (CONTINUED)

Input power for the 3D 60 (Refer to Figure 36) is either 115 VAC or 220 VAC. The installation technician sets the proper voltage selection at the Power Entry Module (PEM). The circuitry is protected by one 6.3A "time-delay" 250 VAC fuse (120 VAC version) or two 5A "time-delay" 250 VAC fuses (240 VAC version). AC voltage is coupled across the isolation transformer thus insulating the instrument from facility power for circuit protection including a 120:120VAC or a 240:120VAC (step-down) voltage ratio.

Input power is routed to a metal oxide varistor (MOV) that's mounted between terminals 2B & 3B of TB1. The varistor provides inline surge protection for the internal circuitry of the system. From TB1, power is routed to the fan, DC power supply and all "power-enable" relays.

The DC power supply provides the necessary DC voltages on J2 for various sub-units throughout the 3D 60 Instrument. There are three separate voltages; ± 12VDC and + 5VDC, with a common DC return providing a logic ground. In addition, the DC power supply provides a "Power Fail" signal that is routed to the ModSig PCBA.

2.5 DC POWER SUPPLY

Parameter	Condition	Limits
Input Voltage		85 - 264 VAC
Input Frequency Range		47 - 440 Hz
Input Surge Current	Cold Start, 110 VAC/220 VAC	17 A maximum/ 34A maximum
Output Voltage Adjustability	+5.1 VDC output (Supply Only)	± 3%

PIN CHART

J1	P1	AC Ground
	P2	AC Neutral
	P3	AC Hot
J2	P1	+ 5.1 VDC
	P2	+ 5.1 VDC
	P3	+ 5.1 VDC
	P4	Return
	P5	Return
	P6	Return
	P7	Return
	P8	+ 12 VDC
	P9	+ 12 VDC
	P10	PFD
	P11	- 12 VDC
	P12	
	P13	- 5 VDC

Table 2.5.1 - Power Supply Data

2.5 DC POWER SUPPLY (CONTINUED)

The BacT/ALERT 3D 60's power supply is a quad output switcher intended for small to medium-sized digital systems. These power supplies also contain built-in over-voltage protection and a "power fail detect" signal.

Universal input voltage allows these supplies to be powered in any country of the world without changing any jumpers or individual switch settings. The unit is capable of supplying the high peak currents necessary to start disk drives and peripheral devices. An integral filter reduces line-conducted noise below FCC and VDE limit B.

The over-voltage protection circuits are designed to activate at 6.25 VDC (± 0.75 VDC) for 5 VDC output. The power supply has a "Power Fail Detection" circuit that produces a "power fail detection" (PFD) output. The PFD signal occurs within milliseconds following an abnormal AC line condition. The delay between the abnormal AC line condition and the PFD output varies depending on AC line variation and power supply load.

If this condition is met, the PFD signal will go to a low state within approximately 3ms. Once the output returns to the +4.75 VDC the PFD signal will return to a high state in 50ms to 200ms. Refer to Table 2.5.1, on the previous page, for Power Supply data and output pin locations.

2.6 CPU PCBA

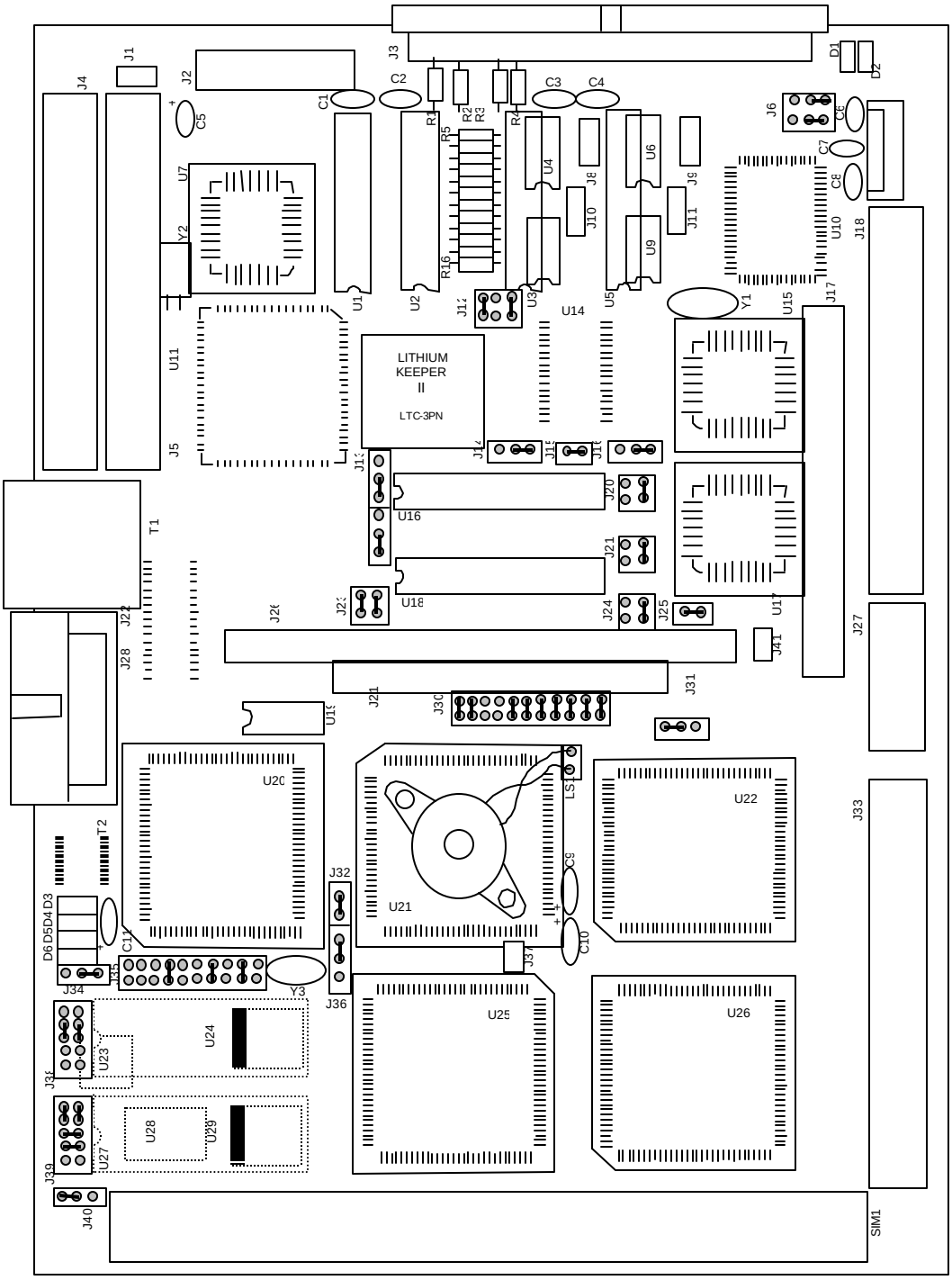


Fig. 37 - CPU PCBA Diagram

2.6 CPU PCBA (CONTINUED)

The CPU PCBA (Reference Figure 37) is an “off-the-shelf” internally mounted WinSystems® computer that combines a 586 (or higher) CPU with Video, Floppy, IDE, Serial and Digital I/O.

The chipset provides the core logic that makes the board PC/AT software compatible. It includes the DRAM controller, bus interface, integrated peripheral controllers (8237 DMA, 82C54 timer, 82C59 PIC, RTC, KYBD controller and CMOS memory) and an internal PCI bus for high-speed operation.

Up to 32 MB of memory can be populated on board with a 72-pin SIMM. The BIOS can detect and automatically support either Fast Page or EDO memory modules. Seven DMA channels are supported, with Channel 2 dedicated to the floppy disk controller. The LPT is jumper selectable for ECP operation. The other DMA channels are wired to the PC/104 connector. An onboard 256KB x 16 DRAM provides 512KB of video memory.

2.7 COMPACTFLASH ADAPTER PCBA

Fig. 38 - CompactFlash Adapter PCBA

2.7 COMPACTFLASH ADAPTER PCBA (CONTINUED)

A CompactFlash Adapter PCBA (with CompactFlash Memory Disk™ installed) is mounted near the WinSystems® motherboard. It is connected by a flat ribbon cable to the motherboard's IDE port. (Refer to Figure 38 or Subsection 4.10.4, Figures 108-112)

The Flash-Memory Disk contains the operating system, BacT/ALERT® 3D 60's software, instrument configurations, operator settings, layout of the instrument pictorial, along with the bottle record data.

2.8 QUAD SERIAL INTERFACE PCBA

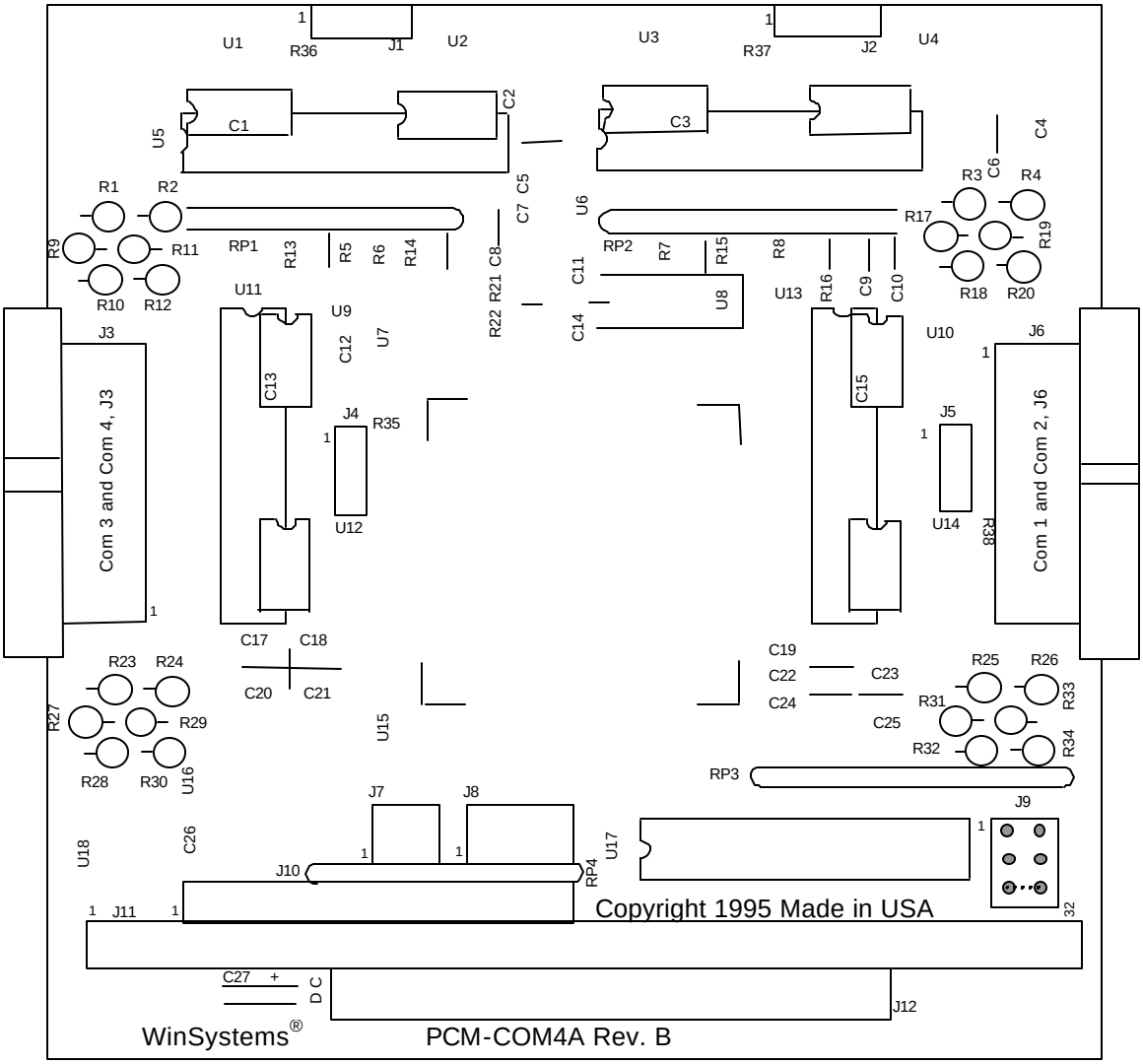


Fig. 39 - Quad Serial Interface PCBA Diagram

2.8 QUAD SERIAL INTERFACE PCBA (CONTINUED)

The Quad Serial Interface (Com4) board (Reference Figure 39) is a daughter board that plugs into the PC/104 bus on the WinSystems® motherboard.

There are four ports on the board. Com 1 is configured as a RS-485 port. Com 2 3 and 4 are configured as RS-232 ports. Com 1 and Com 2 are located on connector J6, while Com 3 and Com 4 are located on connector J3. All communications ports are software supported and operate at a 9.6K Baud data rate.

The Quad Serial is a four-channel serial (INS8250 compatible) P/C 104 module that is based on the 16C554 UART. It is ideally suited for applications running DOS programs or languages that require exact register compatible hardware for program execution. Each of the channels supports RS-232, with optional RS-485 and RS-422 electrical levels to interface with a wide variety of serial communications devices.

The Quad Serial PCBA is I/O mapped. Each channel requires eight port addresses and each is independently decoded within the I/O map. The interrupt status register also requires one I/O port. The addresses are decoded in the PAL and are jumper-selectable, with eight different I/O maps. The Com4 card is a 16-bit stack-through card that supports 8-bit data transfers only.

2.9 RACK CONTROLLER PCBA

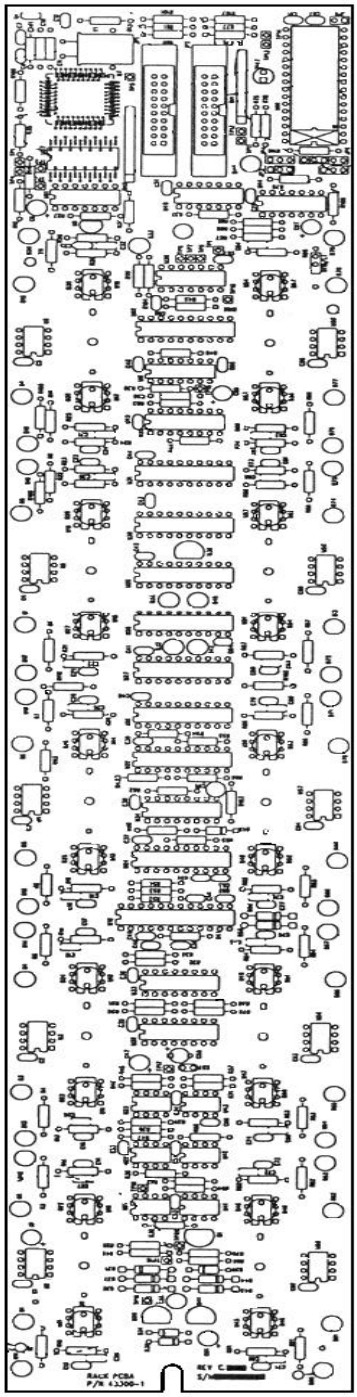


Fig. 40 - Rack Controller PCBA Diagram

2.9 RACK CONTROLLER PCBA (CONTINUED)

The Rack Controller PCBA (Refer to Figure 40), using EPROM-stored software, controls the excitation LEDs. The LED light illuminates and reflects on the bottle sensors, creating emitted measurable values at the photo detectors. The Rack Controller digitizes each cell's photo-detector output for reading by the ModSig's Control Module and for bottle presence detection.

Cell indicator LEDs are controlled for operator information. Status and data are communicated through an RS-485 cable from the Rack Controller to the ModSig board. The microprocessor software also monitors the bottle rack rocking motion with a "Hall-Effect" sensor. In addition, the software normalizes illumination readings with cell and temperature calibration factors. Address lines from the ModSig are used to confirm that the 3D 60's WinSystems® CPU board is addressing the correct Rack Controller thus eliminating the need for switches on each Rack Controller. Calibration values are stored onboard the Rack Controller PCBA in a non-volatile RAM (NVRAM). The Rack Controller PCBA is located in the rear portion of the rack channel of the Incubation Chamber. A fully implemented Incubation Chamber will have three Rack Controller PCBAs.

The microprocessor is the Motorola 68HC11 and the same used on the ModSig PCBA. This microprocessor has separate 16-bit address and 8-bit data lines defined. This eliminates the need of having external address and data multiplexing for the external 32KB of RAM and 32KB of EPROM included on the PCBA.

The clock speed of the 68HC11 is set at 16 MHz by an external crystal. Internally, the microprocessor contains 512 bytes of EPROM, 1024 bytes of RAM, and no ROM. External memory for the microprocessor is on the Rack Controller PCBA. A 16-bit free running counter, driven by a programmable prescaler and other divider chains, provides for a wide range of internal timing periods for software use. Included is a watchdog timer.

The Rack Controller PCBA uses 32KB of static RAM in a surface mount package. The software for most dynamic storage uses this memory. The Rack Controller uses 32KB of EPROM for program storage. Jumpers are included to allow the installation of larger memory, in the event that the 27C256 microprocessor becomes obsolete. Memory parts with less than 90ns access are required.

There are two 20-pin connector positions on the board. Power (+5 volts for each board) is supplied through a cable from the ModSig to the JP2 connector. The other connector, JP1, is cabled to JP2 of the next rack. No other power is required. A fuse on the ModSig protects the set of three Rack Controllers in the Incubator Chamber.

The +5 volt input voltage produces two reference voltages. A +4.5V reference is provided to the A-D converter. A +2.5V reference is provided for the Rack temperature operational amplifiers as well as an accurate current control of the exciter LED's current by an operational amplifier.

Each cell has one exciter LED. Each of these LEDs is driven by an output from a 74ACT374 driver.

One indicator LED is provided for each bottle holder or cell. Each of the LEDs is driven by an output from a 74ACT374 driver. In addition, there are four "*status*" LEDs for general purpose and are explained in the firmware.

2.9 RACK CONTROLLER PCBA (CONTINUED)

Rack Controller Block Diagram

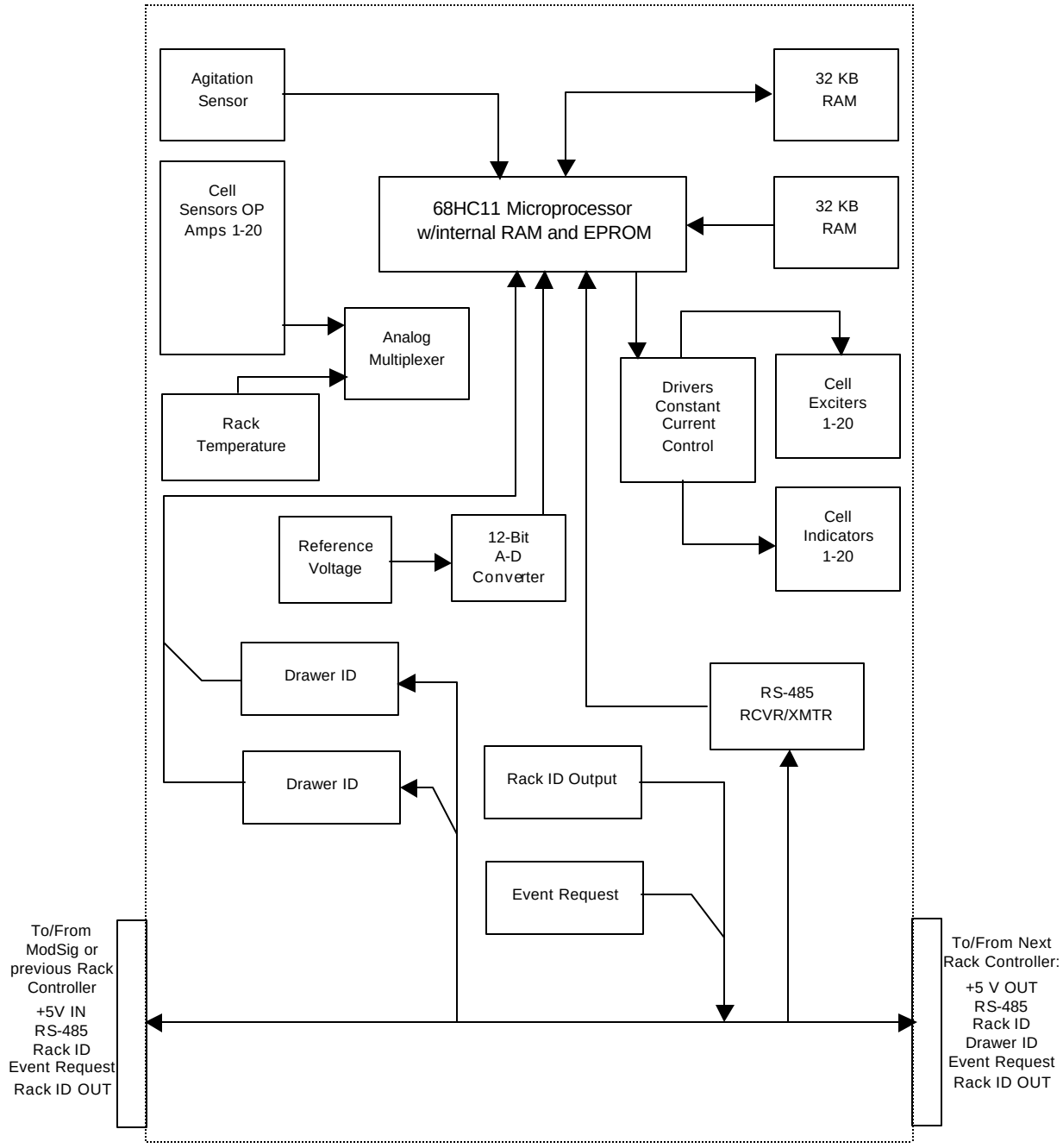


Fig. 41 - Rack Controller PCBA Block Diagram

2.9 RACK CONTROLLER PCBA (CONTINUED)

Each cell has an individual external sensor. The sensor outputs are multiplexed to cascaded operational amplifiers that drive the analog input of an A-D Converter. The cell sensor readings are sent, on request, to the instrument. The Rack Controller firmware detects bottle presence from these photodiode sensors as well.

Circuitry is provided to develop the analog signals to the A-D Converter for the two temperature sensors on the Rack PCBA. These sensors are part of the calibration factors for the bottle cells.

The agitation sensor is a “Hall-Effect” sensor. The sensor detects bottle rack motion for a change in magnetic flux from a rare-earth magnet as the rack is agitated. Each board has a sensor; however, only one position in each drawer is utilized for monitoring.

The *Event Request* signal is a common open drain signal driven by the ModSig PCBA and all Rack Controller PCBAs. The ModSig, Rack Controller and WinSystems CPU board can also read the signal. Its purpose is similar to an interrupt signal; it's to notify the WinSystems CPU board that an event such as a bottle removal has occurred. For the ModSig, this signal is both an output to the WinSystems CPU board and an input from the Rack Controller. When the *Event Request* is pulled low, the Drawer ID low signal used by the Rack Controllers is disabled. The Rack Controller drives the Drawer ID lines to indicate which Rack Controller(s) activated the *Event Request* line. The Rack Control firmware reads the *Event Request* line before and after reconfirming its address, to ensure address lines are not in use.

With only one of four lines low for each drawer, the Rack Controllers can determine which drawer they are in for each address identification for WinSystems CPU board commands. When the *Event Request* is low, this is disabled; allowing the same lines to be used by the Rack Controllers to identify which ones activated the *Event Request*. The driving circuitry and input circuitry is provided on the Rack Controller. Firmware on the ModSig aids the WinSystems CPU board in selecting which Rack Controllers read status, thus expediting bottle detection state changes.

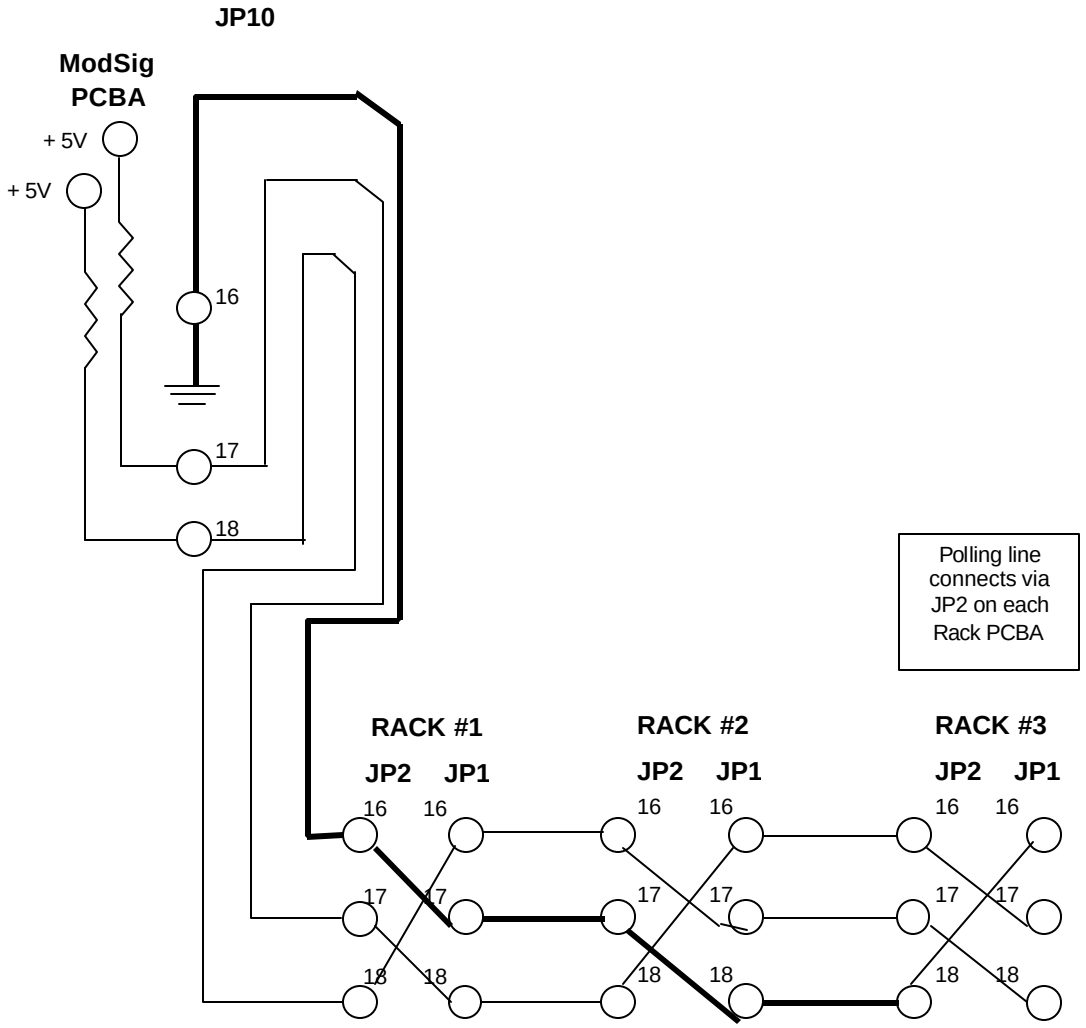
The ModSig makes only one of the three Rack ID lines low for each rack, and then polling this line within the Rack PCBAs, the Rack Controllers can determine their address without having individual address switches. (Refer to Figure 42 on the next page)

Four outputs from one of the 74ACT374-exciter LED drivers serve as the output drivers for the Rack ID Out signals, through open-drain inverters.

The communication between the modules is over RS-485 full-duplex circuitry. The necessary conversion between RS-485 differential signals and single-ended CMOS compatible serial signals, for use by the software, is contained on the Rack Controller. The actual RS-485 signals connect to all Rack Controllers through a connector on the ModSig PCBA.

2.9 RACK CONTROLLER PCBA (CONTINUED)

Rack Address Concept



Rack #1 Address Code	Rack #2 Address Code	Rack #3 Address Code
Input pins 18-17-16	Input pins 18-17-16	Input pins 18-17-16
Binary 1- 1 - 0	Binary 1- 0- 1	Binary 0- 1- 1

Fig. 42 - Rack Address Concept

2.9 RACK CONTROLLER PCBA (CONTINUED)

A 12-bit A-D Converter is provided to convert the rack temperature sensor's analog signals to the digital signals used by the Rack Controller software. The same A-D Converter is used for converting cell sensor analog signals into digital signals.

Using the +2.5V reference voltage, the resistor voltage dividers, an operational amplifier and a MOSFET controls the current for the exciter LEDs. Only one exciter LED is activated at any one time.

2.10 STEP-5 PCBA

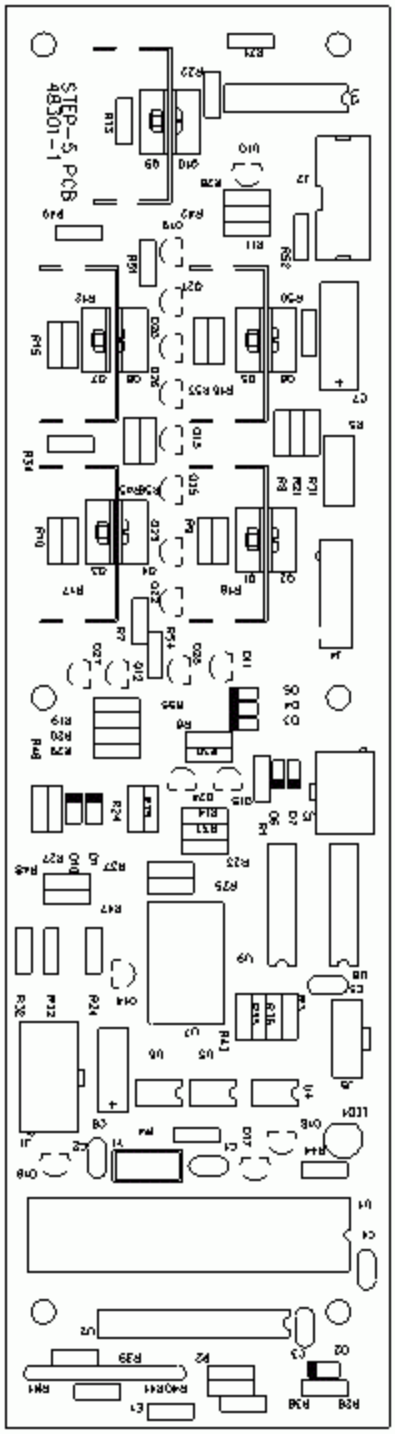


Fig. 43 - Step-5 PCBA Diagram

2.10 STEP-5 PCBA (CONTINUED)

The Step-5 controller board (Reference Figure 43) is designed to drive a five-phase stepper motor at the speed of 60 revolutions per minute. The board operates with input voltages of +5V and +12V, drives the stepper motor directly, and provides starting and stopping functions based on inputs received from the ModSig PCBA.

The STEP-5 controller board drives a Vextra 5-phase stepper motor at 1 revolution per second (+10%) to provide rack agitation. The controller board's inputs, outputs and features are listed below.

1. **Input (DC voltages): +5V and +12V**
2. **Input (Control)**
   - **Interlocks:** Two door switches are used. The two door switches are mechanical reed switches that are closed when the door is closed. The STEP-5 uses optical isolators for these inputs; when a switch is closed, current flows through the corresponding optical isolator's LED. If either switch is open, indicating a door open condition, motor rotation stops. System design uses open switch position to indicate open door so that a disconnected switch will also prevent motor operation. LED 55 & 56, are located on the ModSig PCBA. The LED is on when a switch is closed.
   - **Start/Stop signal**: The start/stop signal will go high to indicate that the STEP-5 should run the agitation motor. This signal, generated by the ModSig PCBA goes high to enable agitation. The input signal is optically isolated on the STEP-5.
   - **Position Sensor:** A Hall-Effect sensor is located at the edge of the Step-5 board and detects the magnet installed in the motor's drive wheel. Both motor motion and drive wheel position tracking is performed in the Step-5 board. Also, when the door is opened, the sensor is used to determine how long to drive the motor so that the racks become stationary in the correct position. If the position sensor is not functioning a fault output will be generated. If the position sensor is not working, the STEP-5 will stop the motor when the door is opened, but the position will be undefined.
3. **Outputs:**

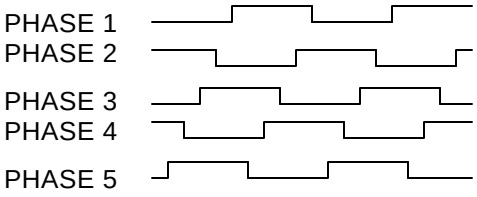
   A Fault Code is sent to the ModSig PCBA if certain conditions occur. The four conditions that initiate this code are:

   - Motor over current
   - Door switch (one door switch indicates open, the other indicates closed)
   - Position sensor not changing state
   - Safety timer not functioning (doesn't go high after door opened)

   (Also, See internal Output Codes)

2.10 STEP-5 PCBA (CONTINUED)

Motor Output: The PM589 motor is a 5-phase stepper, wired in a pentagon configuration, 500 steps per revolution in full step mode. Step sequence example for the 5 phases is:



If an over current occurs, the motor will be stopped. The fault signal is generated by the open-collector of Q16, and goes LOW to indicate a fault. By design, a disconnected power cable will also result in a fault indication.

4. **Internal indicators:**

- **LED 1 Output Codes:**

  [1 flash]: Motor stopped OK
  [2 flashes]: Motor running OK
  [3 flashes]: Motor over current
  [4 flashes]: Door switch (one switch open, the other closed)
  [5 flashes]: Position sensor not changing state
  [6 flashes]: Safety timer not functioning (doesn't go high after door opened)
  [7 flashes] Motor power bad (12VDC)

Note: LED 1 on the Step-5 PCBA constantly outputs one of the above codes. To interpret the code, count the number of longer flashes (LED on periods) after the short start flash.

- **Redundant door timer:** The Step-5 includes a timer, independent of the microcontroller. It disables the stepper motor after the door is opened and some delay has elapsed.

  The redundant door timer consists of an oscillator clocking a pair of 14-bit counters, which are wired to result in a 28-bit binary divider. The counters are continuously reset as long as both doors are closed. If either door interlock opens, the timers are allowed to run. Either of two outputs from the high-order counter may be selected by installing a zero-ohm resistor on the board. The selected output is applied to the PLD that drives the low-side motor transistors. When the output goes high, the drive transistors are disabled, regardless of the state of the microcontroller outputs.

  The redundant timer is included to preclude the possibility that some undefined failure of the microcontroller would leave the motor running after the door is open. The timer delay is selected to insure that, under normal conditions, the microcontroller has time to stop the motor normally before the delay expires. Once the delay expires, the PLD inhibits the clock to the high-order counter to prevent the delay output from cycling. Delay values are selected as described below (output selected is denoted as IC outputs are labeled on schematic): The door timer output is monitored by the microcontroller, which generates a fault output after some delay if the door is open and the timer output does not go high.

2.10 STEP-5 PCBA (CONTINUED)

5. **Motor voltage fault:** If the motor supply voltage goes off, the microcontroller will turn off motor drive until the motor supply is restored.
6. **Power up protection**: The high side predriver transistors require that the 16C74 source current to turn them on. On power up, the I/O port pins of the 16C74 initialize inputs with no pull-ups. This prevents cross-conduction between the high and low side MOSFETS. In addition, as part of firmware initialization, the PLD that controls the low-side drivers does not enable any outputs until PD7 is driven high.
7. **Power down protection**: The configuration bits for the 16F74 will enable the brownout protection that resets the microcontroller if the supply drops below approximately 4V.
8. **Crossover Protection**: While running, the STEP-5 uses a stepping sequence that never switches a motor phase from high to low or low to high. All motor phases go through a step where the phase is off (neither the high or low side driver is on) between high and low transitions. If this sequence is changed (for instance, if the board is ever used to drive a 4-phase stepper), then crossover protection will need to be added to the firmware.
9. **Temperature sensor**: The printed circuit board and schematic provide for a temperature sensor. This part is not installed in the current version of the board.
10. **Firmware:** Firmware is developed in Microchip PIC assembly language. Firmware performs the following functions:
    - Debounce interlock switches
    - Turn motor driver transistors on and off to generate motor drive waveform.
    - Ramp motor up and down
    - Control motor current during ramp up and ramp down using PWM duty cycle
    - Track position of motor using position sensor as 'home' position
    - Monitor motor current for over current condition
    - Program microcontroller hardware to generate PWM clock
    - When door open, monitor safety timeout circuit for proper operation
    - Stop driving motor if 12V motor supply goes off
    - Generate fault outputs

The firmware defines seven states for the stepper motor:

Stopped
Ramping up
Holding (constant speed)
Seeking (waiting for position count to reach ramp down point)
Ramping down
Fault (over current)
Motor power bad

Voltage is applied to the stepper motor using a Microchip PIC16C74 microcontroller and five pairs of MOSFET transistors (5 ea. IRL520 and 5 each IRF9530).

2.10 STEP-5 PCBA (CONTINUED)

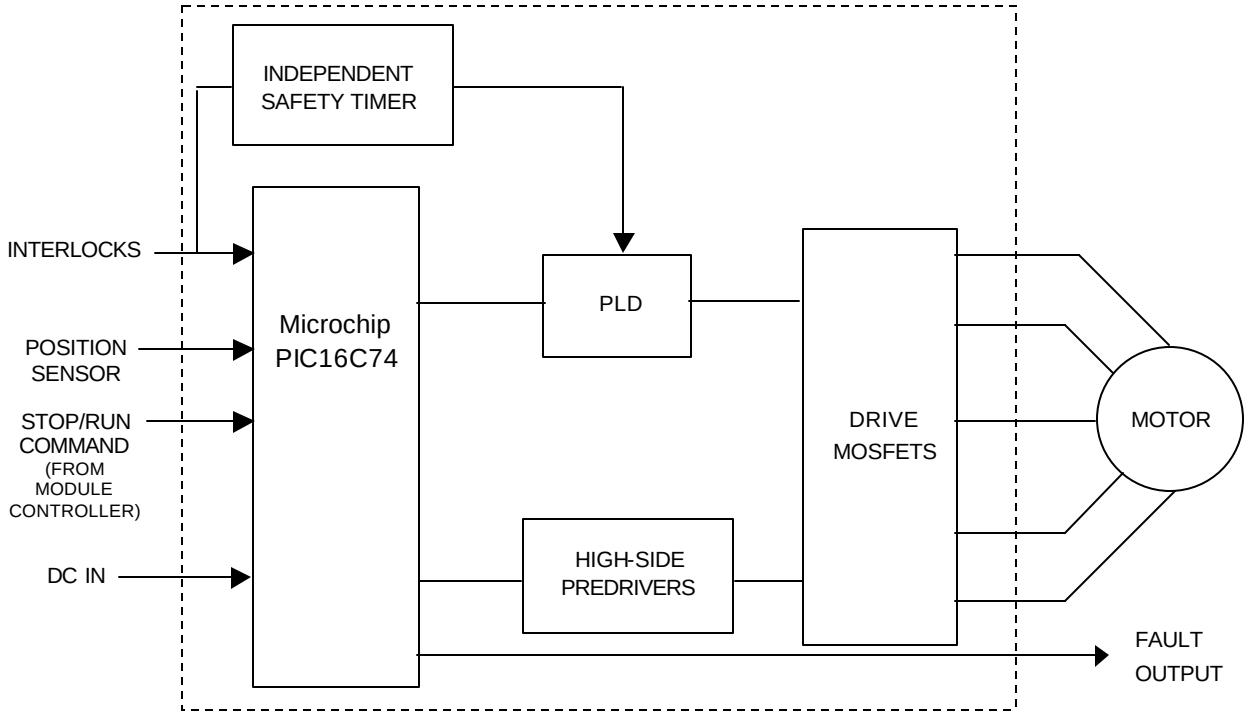


Fig. 44 - Step-5 PCBA Block Diagram

CHAPTER 3
INSTALLATION PROCEDURES

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3 INSTALLATION PROCEDURES

3.1 INTRODUCTION

This paragraph presents the Installation Procedures chapter contents.

3 INSTALLATION PROCEDURES 3-1

3.1 INTRODUCTION 3-1

3.2 BACT/ALERT 3D 60 INSTALLATION PROCEDURES 3-3

3.3 RESTRAINT INSTALLATION 3-14

3.4 SOFTWARE INSTALLATION 3-17

3.5 SWITCHING ON 3-17

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3.2 BACT/ALERT 3D 60 INSTALLATION PROCEDURES

3.2.1 Verification of Site Requirements

For detailed information refer to the Standard Lab Operating Requirements form, to ensure the following are met:

1. Lab environment temperature and humidity are within specified tolerances.
   a. Temperature is between 10° C to 30° C
   b. Humidity is between 20% - 90%, non-condensing
2. Data unit is positioned away from direct sunlight and bright overhead lights.
3. Telephone line for modem access is located within 25'.
4. Floor or bench that's capable of supporting 126.0 Lbs. (57.2 Kg) per instrument installed.
5. Ensure that there is an unobstructed clearance of 4" behind and 12" above the module.
6. Verify that a dedicated AC circuit with proper voltage and current ratings for the data unit and UPS are available, and located within 8'.

3.2.2 Record Line Noise

Using line viewer or power probe and oscilloscope, note the common mode (CM) and normal mode (NM) line noise observed on the AC wall receptacle and record values on the checklist. Acceptable values are < 0.5 V CM noise (ground to any other point) and < 5.0 V NM noise (hot to neutral). Record these measurements on the checklist (CM/NM). Using a digital voltmeter (DVM), measure the potential between neutral and ground. This voltage should be <. 5VAC.

3.2.3 Unpacking

Precautions are to be taken when unpacking the equipment. There should be a comprehensive list of items contained in the box (es) in which the equipment is delivered. Unpacking instructions are illustrated on every instrument's shipping carton. The unpacking instructions may also be found in the BacT/ALERT 3D 60 Operator's Manual.

3.2.4 Repacking

Defective 3D 60 instruments, demo and show units, will require carton repacking for return shipments. Figure 45 - 3D 60 Instrument Repacking Sequence and Figure 46 - 3D 60 Instrument Repack Web Strapping Diagrams, on the following pages, illustrate how to repackage the 3D 60 in the return shipping carton and how to properly secure the carton's web strapping.

3.2.4 Repacking (Continued)

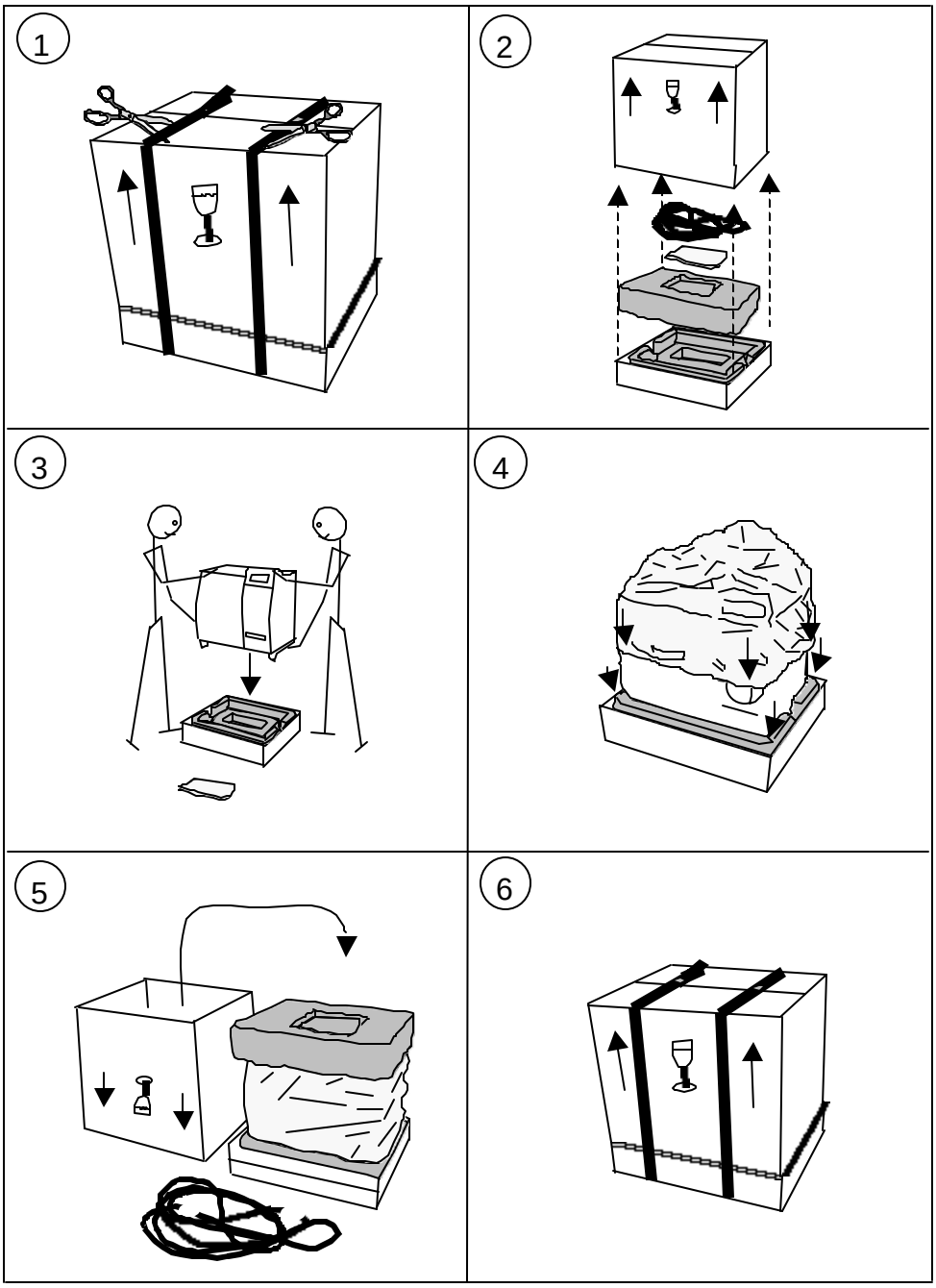

Fig. 45 - 3D 60 Instrument Repacking Sequence

3.2.4 Repacking – Web Strapping (Continued)

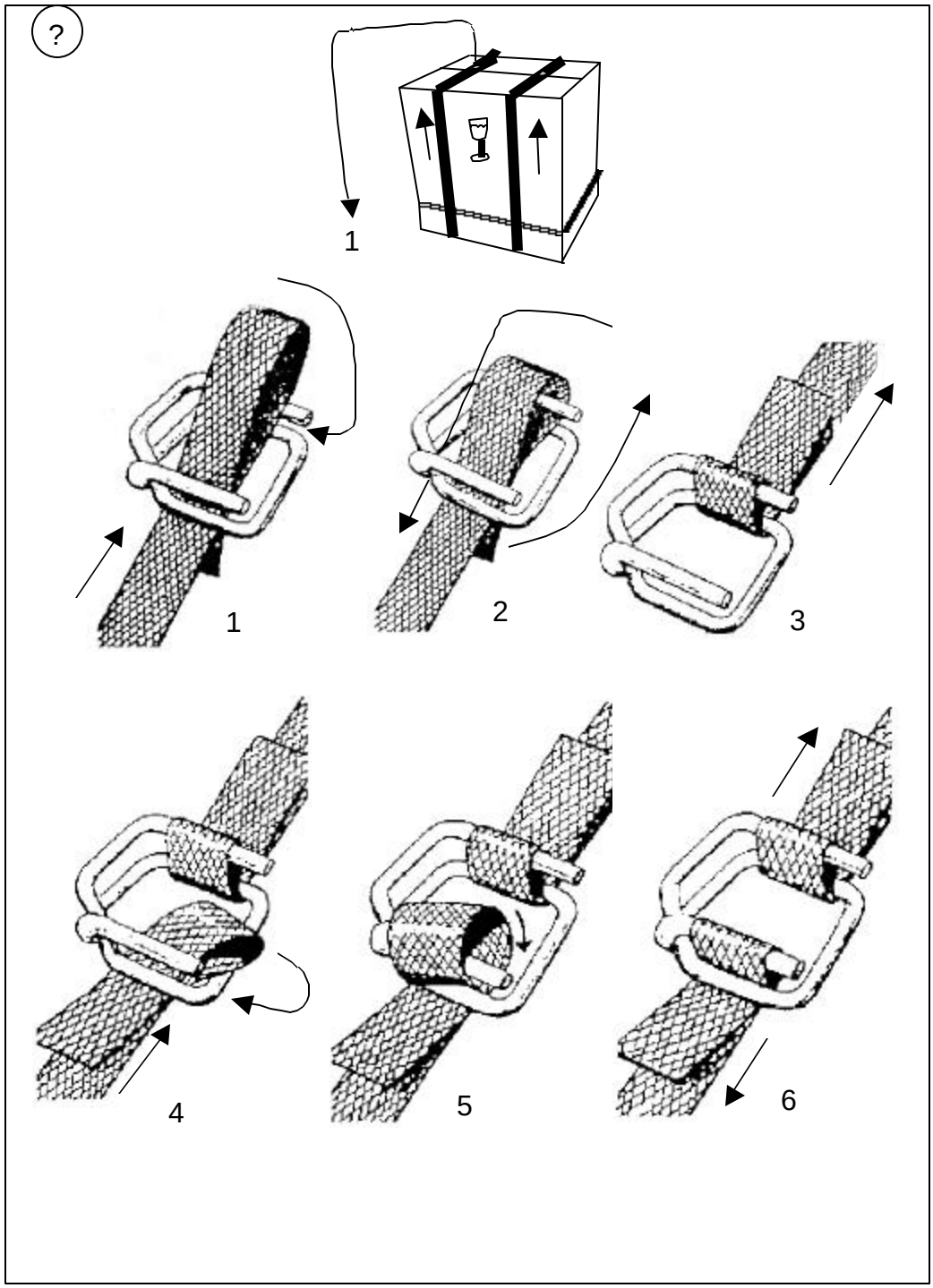

Fig. 46 - 3D 60 Instrument Repack - Web Strapping Diagrams

3.2 BACT/ALERT 3D 60 INSTALLATION PROCEDURES (CONTINUED)

3.2.4.1 Verification of Contents

After unpacking the unit and parts, inspect contents of the BacT/ALERT 3D 60 for shipping damage. Refer to Table 3.2.1 below for parts content listing.

3.2.4.1.1 3D 60 Instrument Parts

These parts are shipped separately or with the unit. These part numbers and "*spares*" may be found in Appendix B - 3D 60 Parts Listing of this manual.

Recommend tools for parts installation are:

Small flat (plane blade) screwdriver

Phillips screwdriver

BacT 3D 60 Instrument Parts

- 3D 60 Instrument
- **BacT/ALERT® 3D 60 Operator Manual**
- CD Multi-language
- 2 ea. 5 amp fuse
- 1 ea. 6.3 amp fuse
- 2 ea. ZIP™ Disk
- Decontamination Procedure
- Decontamination Certificate
- Anonymous BTL Labeling Set – WARNING
- Rack - Bottle Carrier BTA
- Mouse and Mouse Pad
- Barcode Scanner and Manual
- Barcode Scanner Stand
- Keyboard
- UPS Serial Cable
- System Power Cord (Domestic)
- System Power Cord (International)
- Parallel Printer
- Parallel Printer cable
- Printer Cordset (International Euro 220V and UK 240V only)
- ¼" X20X5" screw
- ¼" flat washer
- UPS (Domestic)

  or
- UPS (International)

  or
- UPS (Japan)
- UPS Comm Cable **(Discard the cable shipped with the UPS – DO NOT USE)**
- CRT Monitor (Optional)

  or
- Flat Panel Monitor (Optional)
- Speaker Set -- For 110V BacT 3D 60 (Optional)

  or
- Speaker Set -- For 220V BacT 3D 60 (Optional)
- Fax Modem – Domestic (Optional)

  or
- Fax Modem – International (Optional)
- Serial Modem Cable (Optional)

Table 3.2.1 – 3D 60 Instrument Parts

3.2 BACT/ALERT 3D 60 INSTALLATION PROCEDURES (CONTINUED)

3.2.5 Set AC Power

Perform the Power Entry Module (PEM) fuse replacement procedure to set proper voltage settings. Refer to steps 1-8 below. After setting proper voltage and installing proper fuse(s), discard the remaining fuse(s).

NOTE

The Power Entry Module (805-0017-02) is located in the rear and lower left corner of the instrument. (See Figure 51 – Installation and Setup Diagram)

When configured for 115VAC, the PEM has one 6.3 Amp 250V "timed" fuse (870-0008-25). In addition, a conversion clip is located across the neutral line in the fuse holder (Refer to Figure 49). When configured for 230VAC, each PEM has two 5.0 Amp 250V "timed" fuses (870-0008-24) (Refer to Figure 50).

CAUTION

This instrument comes configured for 240V operation. For other voltage settings, replace fuse(s) as instructed in this section and according to Table 3.2.2 - Facility Power Rating and Conversion Chart on page 3-8.

1. Ensure the instrument is powered down.

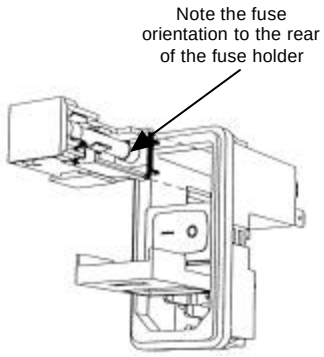

Fig. 47 - Power Entry Module w/Fuse Holder Removed

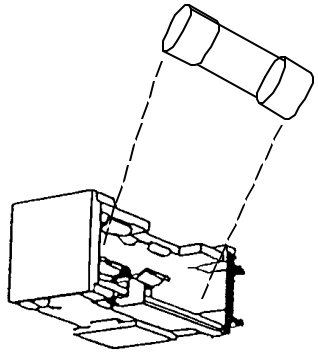

Fig. 48 - Fuse Holder w/Fuse

2. Ensure that the main power and interface cables are disconnected.
3. Open the PEM cover using a small flat blade screwdriver.
4. Slide out the fuse holder (Refer to Figure 47 above).
5. Remove the fuse(s) (Refer to Figure 49 or Figure 50 on the next page).

3.2.5 Set AC Power (Continued)

6. Install the fuse(s) for the proper voltage rating.
7. Reinstall the fuse holder.
8. Close the PEM cover.

Below you will find Table 3.2.2, an installation guide showing specific Facility Power Ratings and the proper fuse installation figure to use.

Facility Power Rating	Figure to Use
110 Volts AC	Figure 48
115 Volts AC	Figure 48
125 Volts AC	Figure 48
200 Volts AC	Figure 49
220 Volts AC	Figure 49
230 Volts AC	Figure 49
240 Volts AC	Figure 49

Note: Facility power ratings for Japan are 100 Volts AC at 50Hz ± 10%. Refer to Figure 49 for fuse installation.

Table 3.2.2 - Facility Power Rating and Conversion Chart

NOTE

Refer to Figure 50 for 230 VAC version. Steps for replacing fuses in the 230 VAC version are the same as the steps taken with the 115 VAC version, with the exception of the fuse size and the 115V Conversion Clip (which is not used for 230VAC). Remove and dispose of the conversion clip if one is present.

CAUTION

Installation of the 115 V conversion clip (Figure 49) into the 230 VAC version (Figure 50) COULD RESULT IN DAMAGE to the unit.

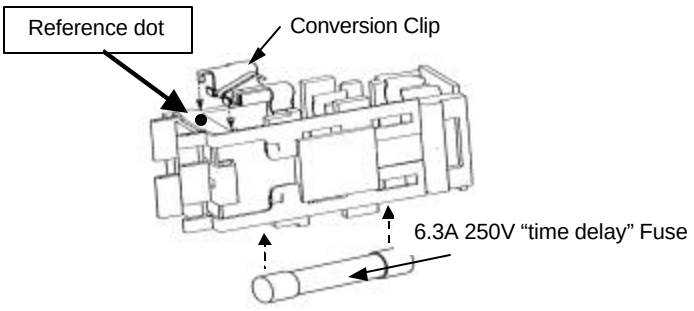

Fig. 49 - PEM w/115 VAC Version

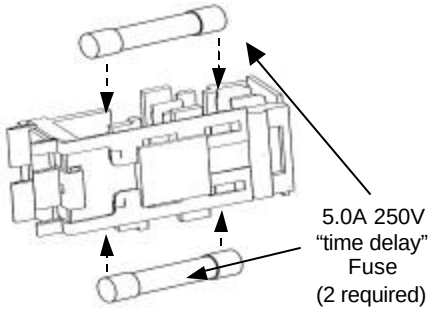

Fig. 50 - PEM w/230 VAC Version

3.2.6 Instrument Placement

Assemble and install the 3D 60 Instrument in the specified installation location.

> **NOTE**
> If countertop or other permanent (bolted) installation is required, see Section 3.3 - Restraint Installation.

3.2.7 Instrument UPS

Place the UPS near the 3D 60 Instrument. Connect the UPS 9-pin control cable from the Accessory Kit to the 9-pin connector on the rear of the UPS labeled "Computer Interface Port". Connect the other end of the cable to the port connector labeled "UPS" (Not "Serial UPS") on the 3D 60's rear bulkhead. **Note: Discard the cable 9-pin cable that comes shipped with the UPS**. (**DO NOT USE**) (See Figure 51 for bulkhead connections). Connect the barcode scanner, mouse, monitor, modem and keyboard to the instrument before powering up. Refer to Table 3.2.3 below and Figure 51 - Installation and Setup Diagram. Setup Steps shown in Table 3.2.3, below, correspond to the numbered setup steps listed in Figure 51.

Setup Steps	Instructions
1	Connect the 9-pin UPS cable into the **UPS** port (not "**Serial UPS**") on the Communications panel.
2	Connect the 3D 60's main power cord into a UPS AC Receptacle labeled as **Surge with Battery Backup**.
3	Plug the UPS main power cable into the properly rated AC wall outlet.
4	Connect the external speaker cable (if external speakers are installed) into the **Ext Spkr** jack on the Communications panel. (Not supplied; optional)
5	Plug the external speaker's AC power cord into the properly rated AC wall outlet. (Not supplied; optional)
6	Plug in the monitor's 15-pin cable into the **Monitor** port on the Communications panel. (Not supplied; optional)
7	Plug in the monitor's main power cable into the proper UPS AC Receptacle labeled as **Surge with Battery Backup**.
8	Connect the keyboard cable into the **Keybrd** port on the Communications panel.
9	Connect the printer's parallel cable into the **Printer** port on the Communications panel.
10	Plug in the printer's main power cord into the UPS AC Receptacle for **Surge Only** (no **Battery Backup**).
11	Connect the modem's communications interface cable into the **Modem** port on the Communications panel. (If supplied and installed)
12	Connect the modem's telephone cable into the **Jack** port on the modem. (If supplied and installed)
13	Plug in the modem's power adapter into the modem. Plug in the main power cord from the adapter into the properly rated AC wall outlet. (If supplied and installed)
14	Connect the barcode scanner's communications cable into the **Barcode** port on the Communications panel.
15	Connect the mouse cable into the **Mouse** port on the Communication panel.

Table 3.2.3 – Setup and Connections

Installation and Set-up Diagram – Port and Power Connections

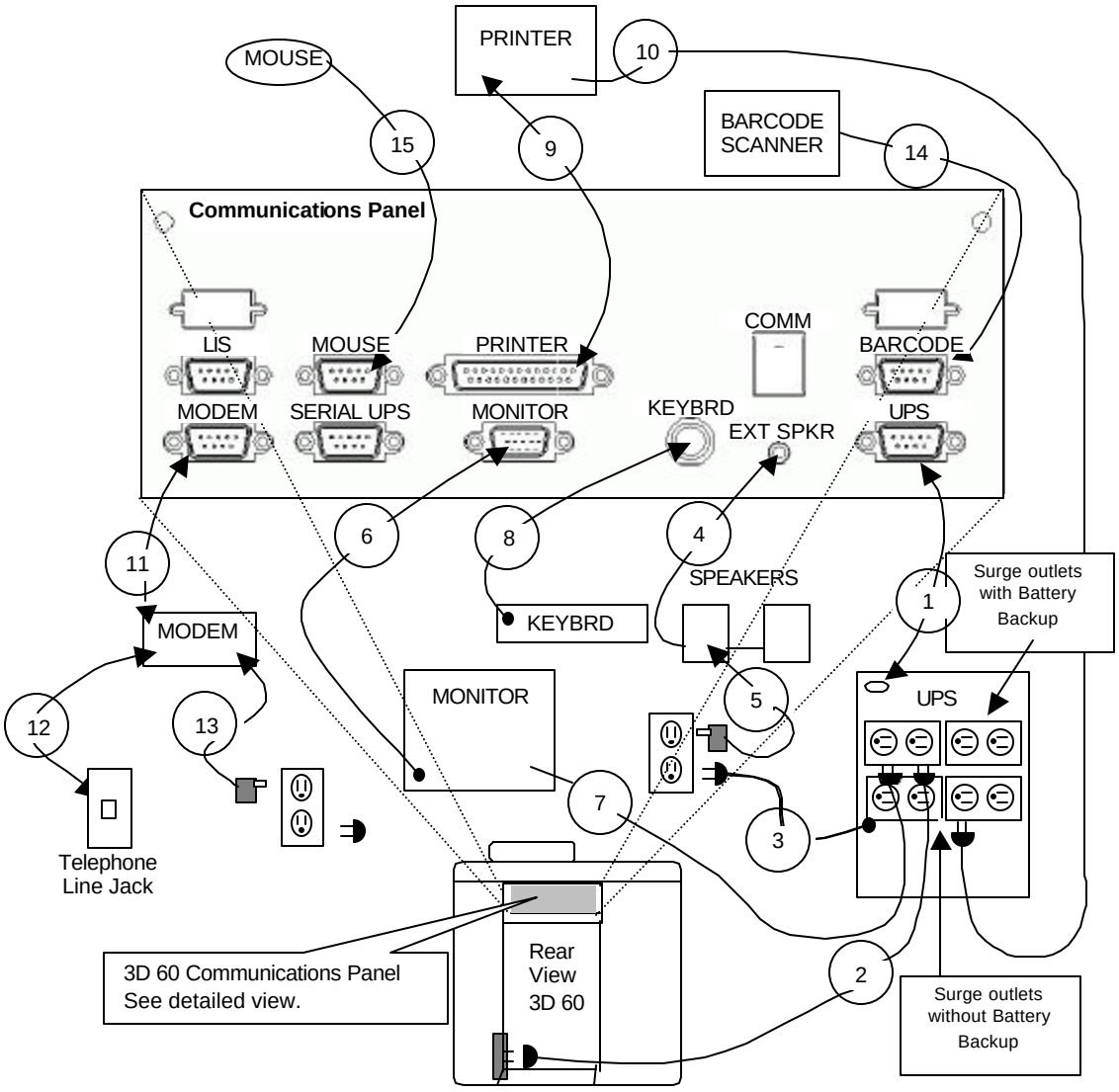

Fig. 51 - Installation and Setup Diagram

3.2.8 Power Up

Press the top of the UPS (toggle) power switch to **ON**. Power up the display monitor. Power on the 3D 60 instrument by turning on the Main Power switch on the rear of the instrument. Refer to Figure 51 for Main Power switch and PEM location on the rear of the unit) Power up the modem and printer.

3.2.9 Instrument Configuration

1. Verify that the screen title "Select" is correctly displayed.
2. Set up and verify maximum test times. (Refer to BacT 3D Operator's Manual).
3. Ensure that the lab supervisor is able to log onto the system with the password '**1-2-3-4**'. (Refer to BacT 3D 60 Operator's Manual for entering password default).
4. Set the displayed date/time to reflect the current date and time in the lab. (Refer to BacT 3D Operator's Manual).

NOTE

The microprocessor (BIOS) clock is set to and must remain at the Universal Coordinated Time (UTC) (formerly Greenwich Mean Time) in a 24-hour format. The BIOS time is set in manufacturing and should not require readjustment in the field. The current UTC may be obtained from the National Technical Information Services WWV radio station by calling 1-303-499-7111, or from the Internet USNO Master Clock. Contact Instrument Service for assistance in setting the BIOS time.

5. Verify that each component is enabled, by viewing the "Main" Screen. Any disabled component will be displayed by gray "Hash Marks" denoting the disabled rack or individual cells within the rack. Use the Enable/Disable Rack, and Cell screen to enable each, accordingly. Hash marks are visible whether racks are enabled or disabled, or whether the unit's racks are configured or not. Check the rack status for Enabled/Disabled status, first.

3.2.10 Temperature

Set the instrument's operating temperature. Once the temperature has stabilized (4 hours), calibrate the actual instrument temperature. (Refer to 3D 60 Operator's Manual).

3.2.11 Error Check

Ensure that no error codes are displayed on the "Main" Screen. Error Codes may be found in Appendix D – Error Codes of this manual.

3.2.12 Modem Functional Test

Set the modem's DIPswitches. (Refer to Figure 53 for DIP Switch settings.)

When modem and telephone connections are available, connect the Modem Interface cable between the modem connector and the port labeled "Modem" (located on the bulkhead on the rear of the instrument). Connect the telephone line (designated for modem access) into the "Jack" port of the modem. (Refer to Figure 52, below, for the bulkhead modem connection and Figure 53 for the 56K Fax Modem configuration diagrams.)

Power up the modem, if you have not done so already. Have bioMérieux Support Services dial into the modem to verify the modem's connection and functionality.

Note: US Robotics "computer" and "jack" modem ports are labeled on the bottom of the modem. (North America only)

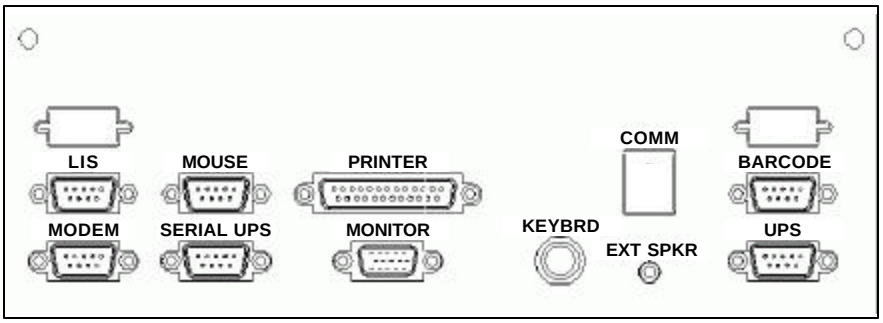

Fig. 52 - Communications Panel Connection Diagram

Connect and configure the modems as shown below.

- Set the modem dipswitch as shown.

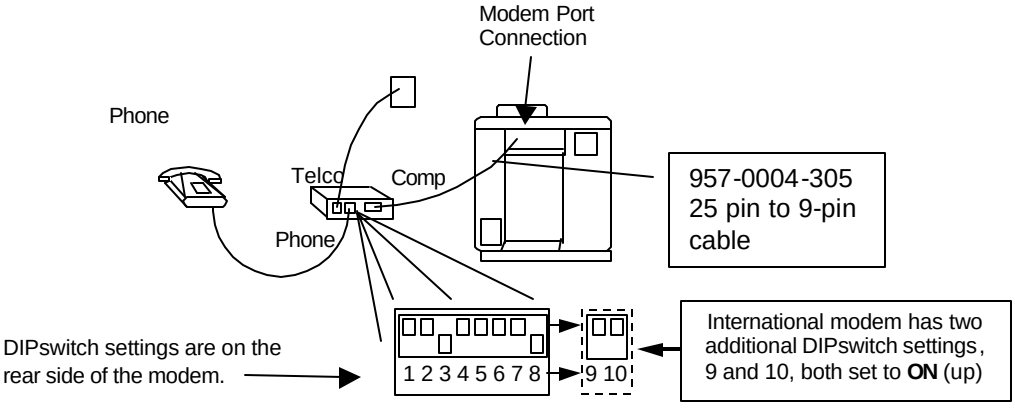

Fig. 53 - Modem Configuration & Dip Switch Settings Diagram

3.2.13 Barcode Reader Functional Test

On the instrument's monitor screen, **click** the [*Load Bottle*] button on the Main Menu. Scan a bottle and verify that the scanned number matches the bottle. **Press** the [*Done*] button to exit the [*Load Bottle]* mode.

3.2.14 UPS Functional Test (3D 60 Only, APC UPS 650)

1. Perform UPS test.
   a. Perform this test only with a properly charged UPS. (See Subsection 4.11.32 for Domestic or Subsection 4.11.33 for International UPS battery hook-up and charging details.)
   b. Set the time to current local time.
   c. Disable the audible alarms via the system software.
   d. Remove AC power from the UPS. Leave the UPS connected to the 3D 60 instrument and leave the power switches to both the UPS and the 3D 60 to **ON**.
   e. Verify that the UPS will emit an audible alarm within 1 minute.
   f. Observe that the blue "Abnormal Shutdown" Screen appears on the instrument's monitor screen.
   g. Observe 3D 60 power off.
   h. After the instrument powers off, restore power to the UPS.
   i. Verify that the instrument retains correct time and has no visible errors displaced on the monitor screen.

3.2.15 Complete the Installation Checklist

Verify that the Installation Checklist is completed. (Refer to Figure 57)

3.3 RESTRAINT INSTALLATION

3.3.1 Overview

The countertop mounting hardware consists of screws and flat washers used to attach the instrument to a countertop or other surface of variable thickness. (Refer to Table 3.3.3 for required parts.)

ITEM	QUANTITY
¼" X 20 X 5" Bolt	4 Each
¼" Flat Washer	4 Each

Table 3.3.3 - Restraint Hardware

3.3.2 Procedure

1. Determine the desired location of the instruments on the countertop or mounting surface.
2. Four bolts fasten the 3D 60 to any mounting surface with four properly positioned ½" holes. (The instrument's 4 rubber feet must be removed)
   a. You must "A" determine the length of the bolts needed for your unique mounting. (Refer to Figure 55)
   b. Properly locate "B" and drill four ¼inch diameter holes in the mounting surface. (Refer to Figure 55)
   c. Position "C" the equipment and secure it with four ¼inch bolts. (Refer to Figure 55)

CAUTION

Care should be taken to avoid braces or bulkheads within the counter which could interfere with hardware installation and mounting. Drilling into these may also reduce the integrity of the counter's strength.

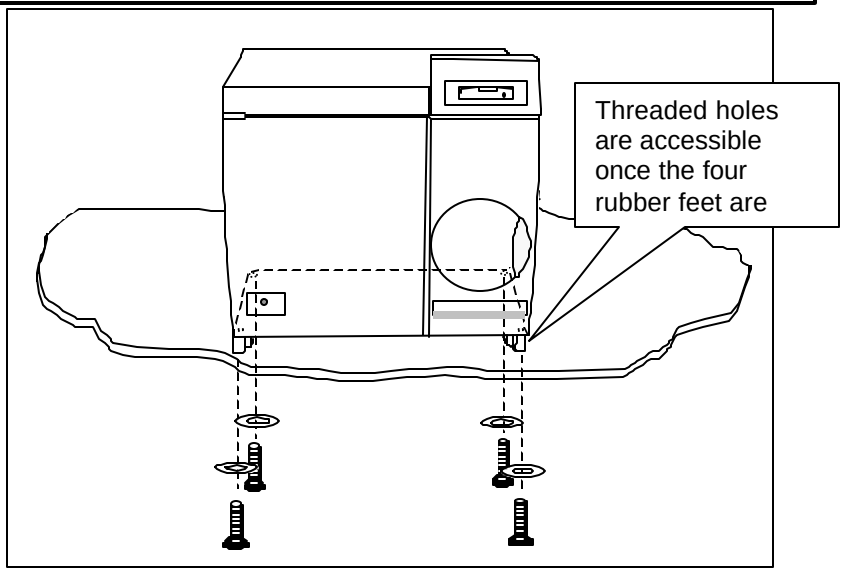

Fig. 54 - Countertop/Surface Mounting Diagram

3.3.2 Procedure (Continued)

d. For mounting surfaces up to 2 ¼" thick you can use the 5 inch bolts supplied with the instrument. For mounting surfaces or surfaces requiring longer bolts, you can use the "Table of Equivalent Dimensions" and Figure 54 - Mounting Surface Diagram, to determine the required bolt length.

Equivalent Dimensions	
½ = 1.3 cm	4" = 10.2 cm
2½ = 6.4 cm	5" =12.7 cm
2 ¾= 7 cm	13" = 33 cm
3 ½= 8.9 cm	21" = 53 cm

Table 3.3.4 - Table of Equivalent Dimensions (Inches to Centimeters)

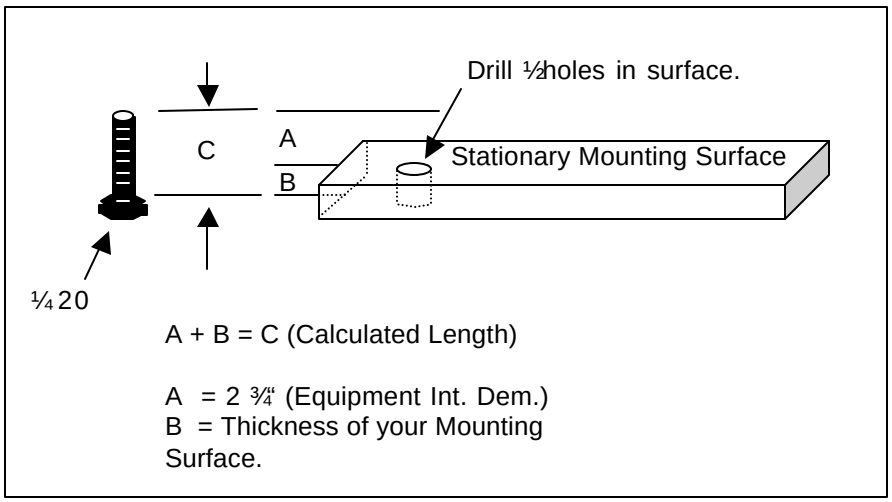

Fig. 55 - Mounting Surface Diagram

e. Transfer the dimensions from the "Mounting Surface (Drilling) Template" to the actual mounting surface and drill four ½ diameter holes. (Refer to Figure 56 – Mounting Surface Drilling Template)

f. Position the instrument. Insert the bolts through 1/4" flat washers, through the mounting surface and into the threaded inserts of the instrument. (Refer to Figure 56 – Mounting Surface Drilling Template)

g. Lightly tighten the bolts.
Note: Over-tightening the bolts may loosen or damage the threaded inserts.

3.3.2 Procedure (Continued)

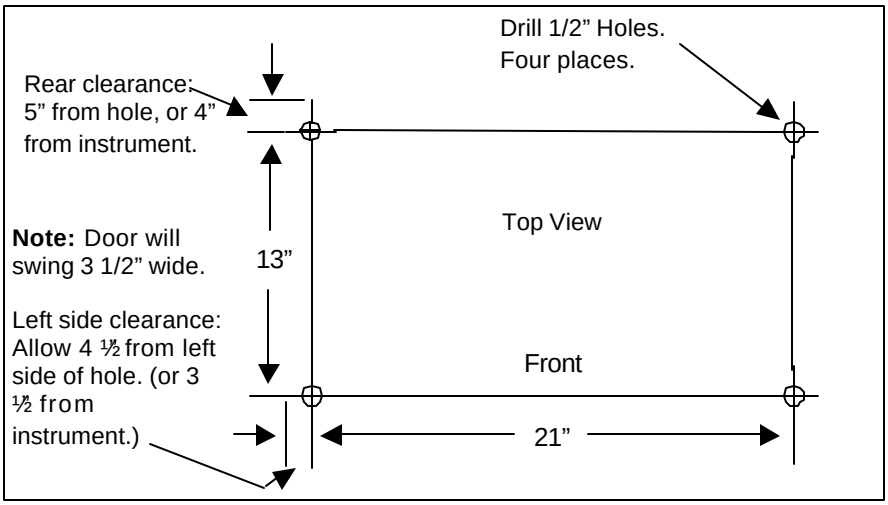

Fig. 56 - Mounting Surface (Drilling) Template

3.4 SOFTWARE INSTALLATION

Although software installation is not required during setup of the BacT/ALERT 3D 60 instrument, there is one instance where the operating software must be reinstalled.

When the Flash Memory Disk is defective, the disk should be replaced and the system software reinstalled. See, Subsection 4-10-5 - Software Installation and CompactFlash Memory Disk Replacement for specific software installation requirements after designated remove and repair procedures are performed on the CompactFlash Adapter PCBA.

3.5 SWITCHING ON

The following steps offer suggested power up and device power cord connection procedures for the BacT/ALERT 3D 60 instrument. Proper battery hookup and installation of the UPS is required prior to taking the following steps below.

Refer to Subsection 4.10.32 - APC Back-UPS Model 650 (Domestic Model) or Subsection 4.10.33 – APC UPS (International Model) for UPS installation procedures.

Plugging peripheral device power cords into the UPS "*Surge and Backup Battery*" or "*Full-Time Surge Protection*" AC outlets is required prior to powering up the instrument.

1. Plug the printer's power cord into one of the "Surge" outlets on the UPS. Outlet for the printer will not require Backup Battery protection.
2. Plug in the display monitor's power cord into a "Surge Protected/Battery Backup" outlet on the UPS. The Display Monitor is required for proper shutdown of the instrument during facility "power-fail" conditions.
3. Plug the 3D 60's main power cord into a "Surge Protected/Battery Backup" receptacle on the UPS. UPS battery backup is required to ensure enough time to properly shut down the 3D 60 instrument during facility "power-fail" conditions.
4. Power up the UPS and ensure the battery is fully charged.
5. Power up the peripheral devices.
6. Power up the 3D 60 instrument.

3.5.1 Initialization

Initialization of the 3D 60 instrument is essentially nothing more than observing that the instrument powers up, the system software boots the unit and the Display Monitor displays the "Main Screen".

BacT/ALERT® 3D 60 Installation Checklist

SITE NAME _____ **SERIAL #** _____

CITY, STATE _____ **SERVICE CALL #**_____

		Pass	Initials
1.	Site Requirements are met	____	_____
2.	Unpack and Verify Contents	____	_____
3.	Restraint Installation (if required)	____	_____
4.	AC Power Configuration	____	_____
5.	External UPS	____	_____
6.	Instrument Placement	____	_____
7.	Configure Instrument	____	_____
8.	Temperature Calibration	____	_____
9.	Modem Function Validation	____	_____
10.	Barcode Reader Validation	____	_____
11.	UPS Function Validation	____	_____
12.	Record Software Revision and Annotate Logbooks	____	_____

The following table shows items that may be connected to the instrument as “shipped” or “optionally installed” parts:

UPS (Domestic or International)	_____	External Speaker Set (Domestic or International)	_____
Monitor (Flat Panel or CRT)	_____	Keyboard (Must be installed with the instrument)	_____
Printer	_____	Barcode Scanner	_____
Modem AC Adapter (Must be installed with modem)	_____	Mouse (Must be installed with the instrument)	_____
Modem (Domestic or International)	_____		

Comments: _____

_____

_____

_____

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Fig. 57 - Installation Checklist

CHAPTER 4
SERVICING

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4 SERVICING

4.1 INTRODUCTION

This paragraph presents the Servicing chapter contents. Subjects include tools required for servicing, PMs, Power Up/Down Procedures, Software Diagnostics and general maintenance or repair.

4 SERVICING 4-1

4.1 INTRODUCTION 4-1
4.2 SPECIFIC TOOLS AND REQUIRED 4-3
4.3 POWER UP/DOWN PROCEDURES 4-3
4.4 MB CONVERSION PROCEDURE 4-5
4.5 DATA BACKUP/RESTORE PROCEDURES 4-9
4.6 PREVENTIVE MAINTENANCE 4-11
4.7 DIAGNOSTICS AND TROUBLESHOOTING 4-13
4.8 SOFTWARE DIAGNOSTICS 4-15
4.9 ALIGNMENTS AND CALIBRATIONS 4-69
4.10 REMOVE AND REPLACE PROCEDURES 4-79
4.11 POST SERVICE VALIDATION 4-175

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4.2 SPECIFIC TOOLS AND REQUIRED

The following is a list of the tools required for maintenance of the instrument:

- Calibrated Digital Voltmeter (DVM) capable of measuring .01 VDC
- Calibrated Thermometer, NIST traceable and accurate to ± .5°C
- Lint free cloth
- Vacuum Cleaner
- Portable ESD Kit (strap and mat)
- Calibrated Reflectance Standards (Four (4) - each identified by the number of rings around the end of the reflector)
- BTA/3D 60 Field Utilities disk (P/N 22155-5)
- Zip Disk Backup (copy of the database)
- Standard Field Hand Tools

Table 4.2.1 – Required Tools and Equipment

4.3 POWER UP/DOWN PROCEDURES

4.3.1 Introduction

The following procedure is designed to properly bring the BacT 3D 60 system to "*Power Up*" and "*Power Down*", gracefully.

4.3.2 3D 60 Power Down

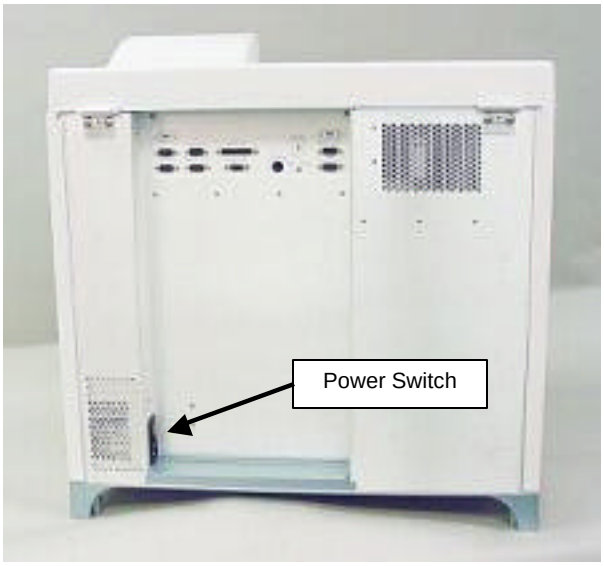

Fig. 58 - 3D 60 Instrument - Power Switch

4.3.2 3D 60 Power Down (Continued)

1. Exit from the operating system by pressing <**Esc**>, <**Y**> <**E**> <**S**>.
2. A blue screen appears and the following will be displayed:
   - *Normal shutdown in progress*
   - *Shutdown complete*
3. After the DOS prompt appears, power can be removed by accessing the PEM's Main Power Switch on the rear of the BacT/ALERT 3D 60 instrument.
4. Turn the Main Power Switch, located on the Power Entry Module (PEM), to **OFF**. (Refer to Figure 58)
5. If performing work on the interior of the chassis, disconnect the Main Power Cord from the PEM.

4.3.3 3D 60 Power Up

1. If the main power cord has been disconnected from the PEM, reconnect it.
2. Turn Main Power Switch on the PEM to **ON** to provide AC power to the 3D 60 instrument. Wait for the system to initialize and come up to the "Main Setup" screen. (Refer to Figure 58 for Main Power Switch location)

4.4 MB CONVERSION PROCEDURE

4.4.1 Overview

By removing power from the agitation (Step-5) motor and anchoring the linkage assembly that rocks the racks, the incubation chamber can be converted to a stationary (MB) configuration.

4.4.2 Procedure

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two screws securing the Top Panel and secure it into the “Up” position.

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

3. Unplug connector at J4 on the Step-5 PCBA. This removes +12VDC power to the Step-5 PCBA and Motor. (Refer to Figure 59)
4. Unplug the connector at J1 on the Step-5 PCBA. This removes communication between the ModSig PCBA and the Step-5 PCBA, and the +5VDC power. This removes false (agitation) Stepper Motor errors in the software. (Refer to Figure 59)
5. Remove the screw shown in Figure 60 (**Hole #1**).
6. Insert the screw that was removed in Step-5 above and insert it into **Hole #2.** (Refer to Figure 61) to disable the rocking (agitation) of the rack assembly. You may have to shift the racks slightly forward or backward to align the screw with the screw hole in the linkage. (Refer to Figure 61)

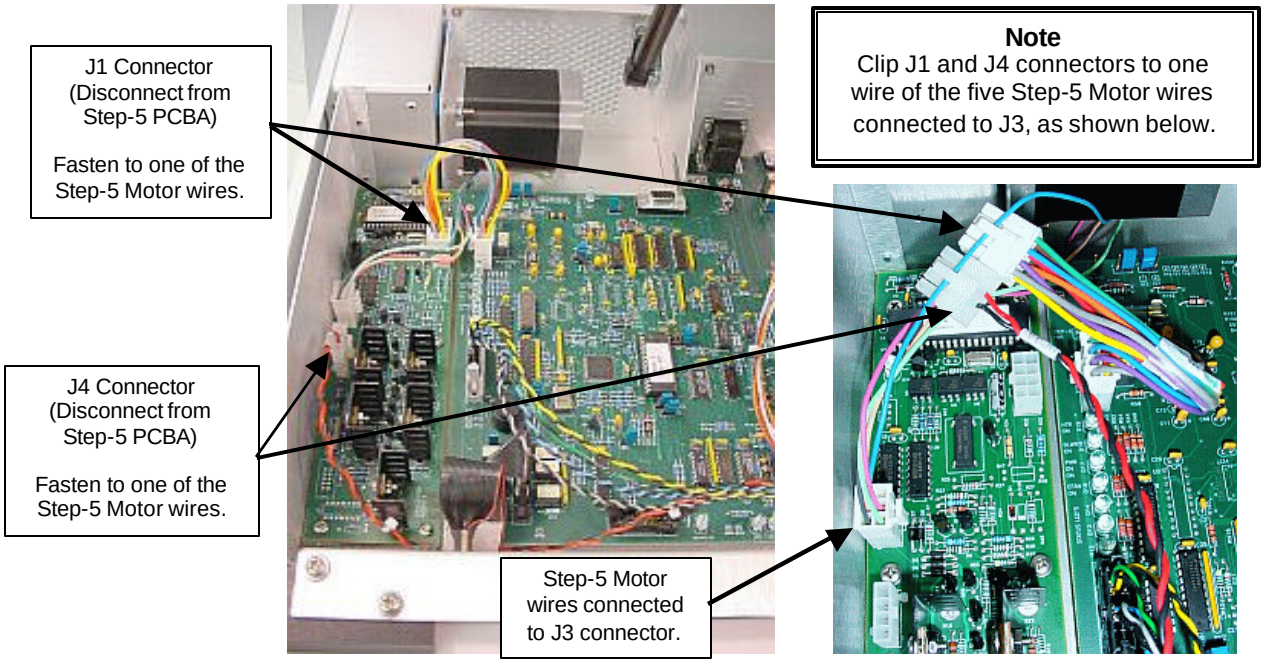

Fig. 59 - Step-5 Motor PCBA Power Disconnect

4.4 MB CONVERSION PROCEDURE (CONTINUED)

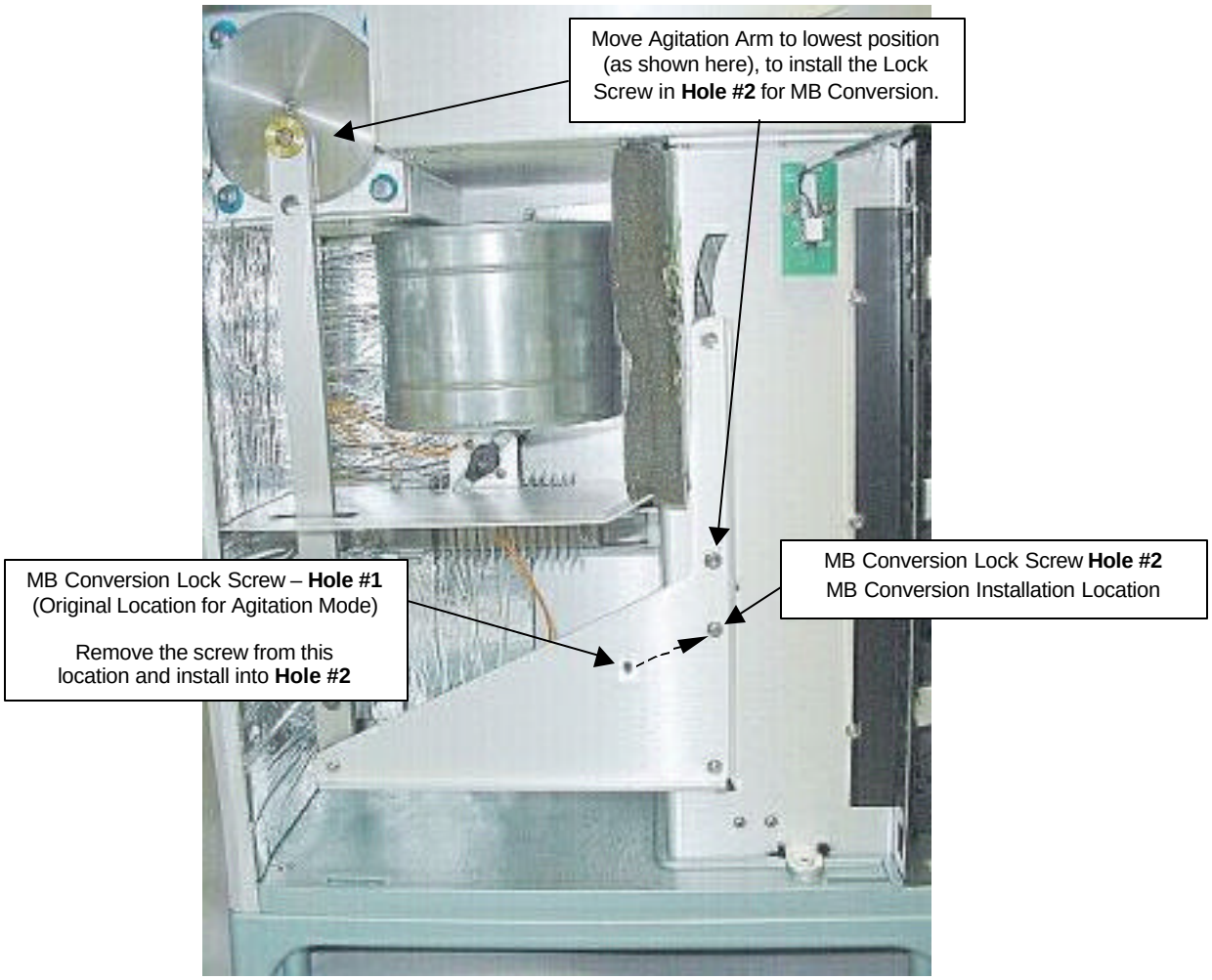

Fig. 60 - MB Conversion – Lock Screw Removal

4.4 MB CONVERSION PROCEDURE (CONTINUED)

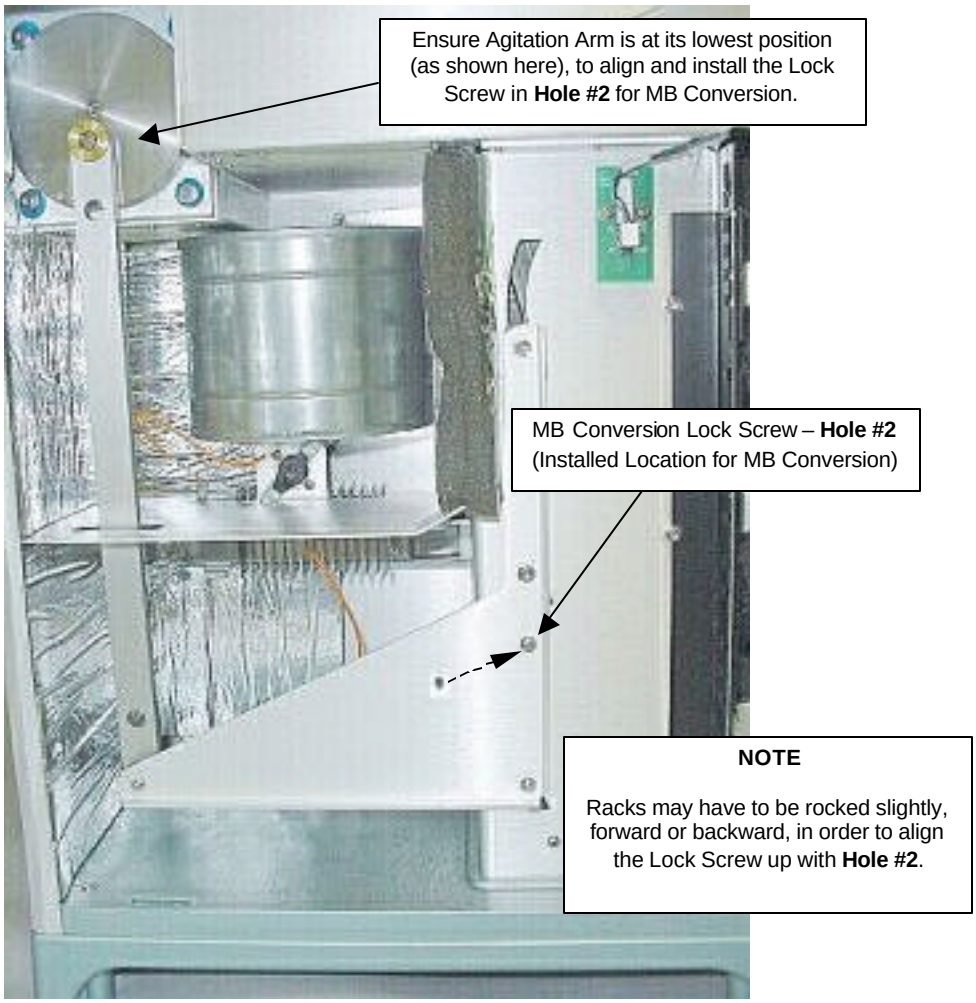

Fig. 61 - MB Conversion – Lock Screw Installation

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4.5 DATA BACKUP/RESTORE PROCEDURES

4.5.1 BacT/ALERT 3D 60 - Data Backup Procedure

1. Refer to the BacT/ALERT 3D 60 Operator's Manual and NOTE box, below.
2. Go to "Setup" screen.
3. **Enter** password numbers "<**4**><**3**><**4**><**3**><**2**><**1**><**2**><**1**>"
4. **Click** on the BACKUP MANAGEMENT [*Setup*] button. (Refer to Figure 62)

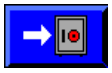

Fig. 62 - Backup Management Button

5. Insert the backup disk into the Zip drive.

> **NOTE**
> Only 250 Megabyte zip disks should
> be used as the backup media.

6. **Click** on the [*Start Backup*] button. (same as the [*Backup*] button graphic above but with an exclamation mark to the left of the "right-arrow" symbol).
7. Note the flashing backup icon that appears on the screen. When this icon disappears, backup is complete. Total backup time is approximately 20 minutes.
8. **Click** on the [*Cancel*] button. (Refer to Figure 63)

Fig. 63 - Cancel Button

9. **Click** on the [*Previous*] button to return to the "Main Screen".

4.5.2 BacT/ALERT 3D 60 - Data Restore Procedure

1. Insert the Zip disk that has the backup data copied to it and install it into the Zip drive.
2. **Press** <Esc> and <Y> <E> <S> on the keyboard to exit the 3D 60 program.
3. At the **C:\>** prompt, **type RESTORE** and **press** the <ENTER> key on your keyboard. When the program has completed restoration successfully, the following message will appear:

*** RESTORE COMPLETE**

4. At the **C:\>** prompt, **type XBTA3D**, and **press** <ENTER> on your keyboard to restart the 3D 60 program.

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4.6 PREVENTIVE MAINTENANCE

This section refers to the descriptions of preventive maintenance operations.

4.6.1 Overview

The Preventive Maintenance (PM) procedure has been provided for personnel trained by bioMérieux. PMs are required to be performed annually, unless specified otherwise.

4.6.2 Perform Data Backup

Refer to Section 4.5 – Data Backup/Restore Procedures.

4.6.3 Barcode Reader Functional Test

1. On the 3D 60 instrument, click on the [*Load Bottle*] button from the "Main Screen".
2. Scan the bottle, and verify that the scanned and screen numbers are the same. Do not load the bottle but do **click** on the [*Done*] button to exit the load mode.

4.6.4 Printer Maintenance

With the printer powered off, clean the print head guide rod of any debris. Clean the debris from the interior of the printer. Run a printer *self-test* and install a new ink cartridge if the print quality is poor. (Reference specific printer operator or service manual for details.)

4.6.5 Temperature Verification

Wait for the temperature to stabilize. Check the Incubation Chamber temperature using the internal reference thermometer. Calibrate the system if the difference between the measured temperature and the BacT 3D 60's temperature display exceeds ± 0.5º C.

4.6.6 Disabled Cell Check

Inspect the Incubation Chamber for disabled cells and attempt to re-calibrate those cells with Single Slug calibration standards. If unable to recalibrate, review with the customer and determine what corrective action will be suitable.

4.6.7 +5 DC Voltage Verification

Verify and *adjust the power supply voltage only if out of tolerance.* The +5 VDC Power Supply verification is done on the ModSig PCBA in the Electronics Compartment. Refer to Subsection 4.9.6 to perform System Power Supply Check and Adjustments.

4.6.8 UPS Test

1. Perform UPS test.
   a. Set the time to current local time.
   b. Disable the audible alarms via the system software.
   c. Remove AC power from the UPS. Leave the UPS connected to the 3D 60 instrument and leave the power switches to both the UPS and the 3D 60 to **ON**.
   d. Verify that the UPS will emit an audible alarm within 1 minute.
   e. Observe that the blue "Abnormal Shutdown" Screen appears on the instrument's monitor screen.

4.6.8 UPS Test (Continued)

f. Observe 3D 60 power off.

g. After the instrument powers off, restore power to the UPS.

h. Verify that the instrument retains correct time and has no visible errors displaced on the monitor screen.

4.6.9 "Door Open" Test

With the door of the BacT 3D 60 instrument open, there are some functional indicators that will alert the operator that the system is not agitating.

1. Open the door on the BacT 3D 60. There should be a red-screen on the display monitor with a fault icon **20** that will indicate that the door is open after approximately 2 minutes.
2. An audible alarm will also sound when the door is ajar.
3. You can visually check LED D55 and D56 on the ModSig PCBA. They both should illuminate when the door is closed. Both are off when the door is open. (Refer to Figure 64 for LED D55 and D56 locations).
4. Use the "Incubation Heater" diagnostic screen (See Software Diagnostics, Subsection 1.8) to verify the door switch settings.

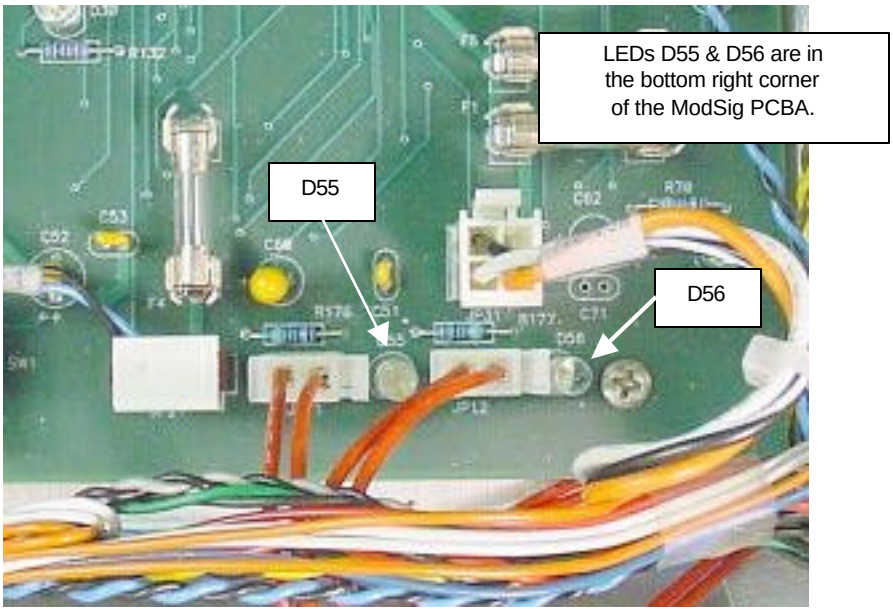


Fig. 64 - ModSig PCBA LED 55 and 56 location

4.6.10 Completing the Preventive Maintenance Card

Complete the Preventive Maintenance Card and transfer any pertinent information from the back of the old card to the back of the new card. Affix the card to the BacT 3D 60 Instrument.

4.7 DIAGNOSTICS AND TROUBLESHOOTING

This chapter describes the procedures for detecting the faulty component(s), depending on the type of failure. It also describes the remedial action to be taken to return the instrument to serviceable condition.

4.7.1 Introduction

This section pertains to the symptomatic problems that may appear during normal operation of the BacT/ALERT 3D 60. These errors will cause an error code to appear. Error Code information can be found in Appendix D of this manual or the BacT/ALERT 3D 60 Operator's Manual.

4.7.2 Symptomatic Errors

PROBLEM	CAUSE	SOLUTION
Anonymous Bottle indicated in empty cell	Cell not calibrated.	Recalibrate the cell using the "Single Cell Calibration" screen and single rod calibration standards. If the cell cannot be calibrated or calibration does not fix the problem, replace the rack or make the checks listed for Fault #60, starting with the second Cause/Solution.
Cell indicator(s) never come on **NOTE** Investigate all fault codes reported for this unit before making these checks.	Rack PCBA is defective. (If only 1 cell error)	Replace rack assembly.
	Rack, ModSig or cables defective. (More than 1 cell or all cells)	Replace rack assembly, ModSig PCBA or defective cables.
External alarm not sounding See Note 1	Operator has disabled all audible alarms.	No action necessary, provided speaker test described in Note 1 works.
	Cable from speaker to the ModSig PCBA is loose or defective.	Secure or replace cable and speaker.
	Speaker is defective.	Replace speaker.
	Cable from the ModSig PCBA (P13) to CPU PCBA (J3) is loose or defective.	Secure or replace cable.
	ModSig PCBA is defective.	Replace the ModSig PCBA.
	CPU PCBA is defective.	Replace CPU PCBA.

Note1: Investigate any fault codes reported for the instrument before making any checks. To test the speaker, press the [Load Bottles] button on the Main screen. The speaker should beep once.

Table 4.7.1 – Symptomatic Problems

Fig. 65 - Scanner Default Settings Barcode

4.7.2 Symptomatic Errors (Continued)

PROBLEM	CAUSE	SOLUTION
Barcode Scanner does not beep	The Barcode Scanner needs to be reprogrammed to the default settings.	Scan the Barcode label in Figure 64
	Barcode Scanner is defective.	Replace Barcode Scanner
Barcode Scanner does not auto scan	Fuse is blown.	Check and replace F2 on the ModSig PCBA.
	Spotter beam is not hitting the reflective label.	Observer the reflective label in the Bar Code Aperture. There should be a small red dot produced by the scanner's spotter beam. Verify that this dot falls on the reflective label. If not, reseat the scanner cradle so that the beam falls on the reflective label.
	The Barcode Scanner needs to be reprogrammed to the default settings.	Scan the barcode label in Fig 64
	Scanner is defective.	Replace scanner.
Barcode Scanner scans but nothing is read. **NOTE** Investigate all fault codes reported for this module before making these checks	The Barcode Scanner needs to be reprogrammed to the default settings.	Scan the barcode label in Fig 64.
	There is (are) loose connection(s) or defective cables.	Check the connection where the scanner connects to the rear for the instrument.
	The Barcode Scanner is defective.	Replace the Barcode Scanner.
	The CPU PCBA is defective.	Replace CPU PCBA.
Keyboard not responding **NOTE** Investigate all fault codes reported for this unit before making checks.	Blown fuse.	Check and replace F3 on the ModSig PCBA as required.
	The cables are loose or defective.	Check the connection to the rear communications panel (bulkhead). Secure or replace as required.
	The keyboard is defective.	Replace keyboard.
	CPU PCBA is defective.	Replace CPU PCBA.
	ModSig to CPU PCBA cable is loose or defective.	Secure or replace the cable.

4.8 SOFTWARE DIAGNOSTICS

4.8.1 Button Legend

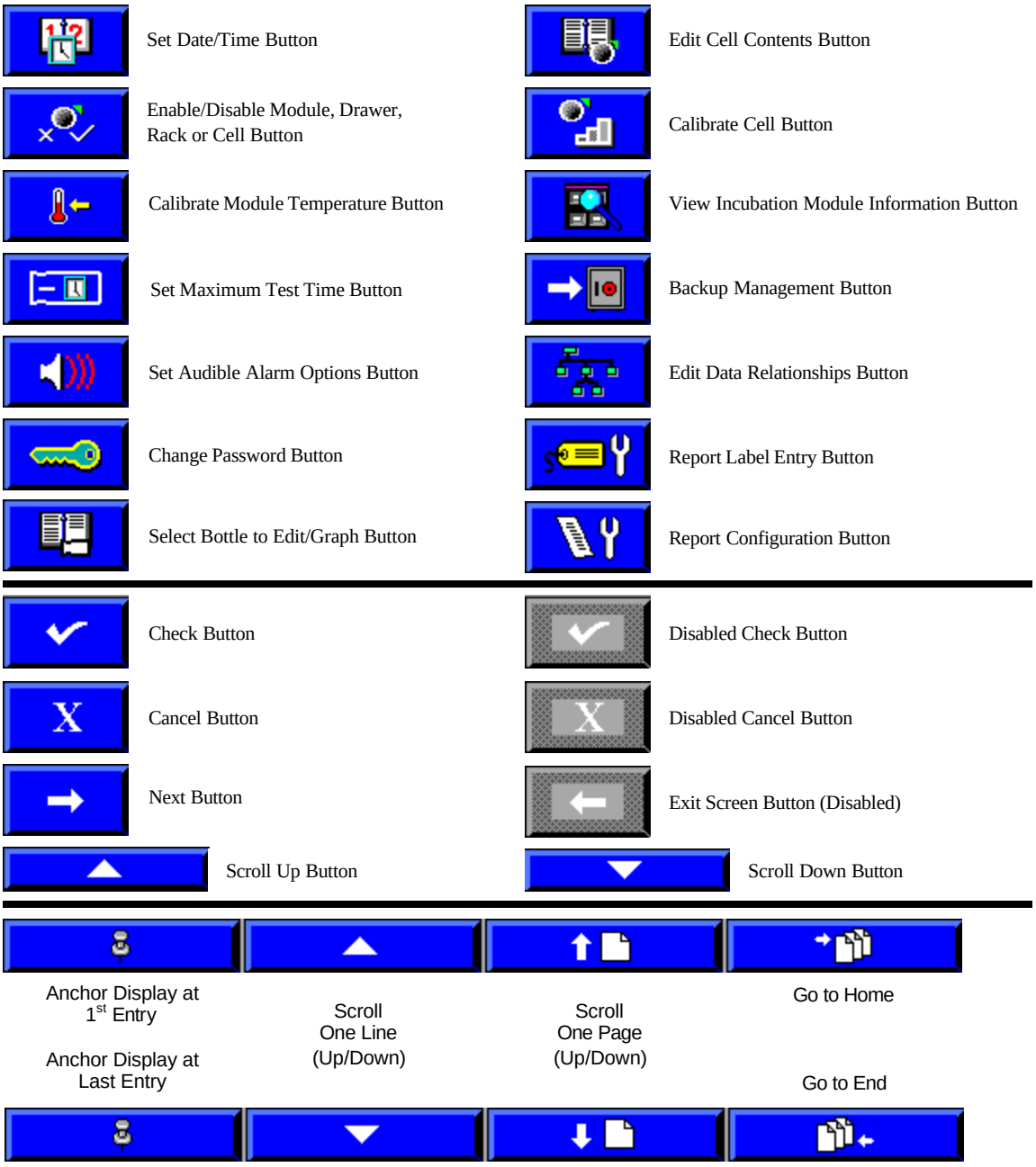


Fig. 66 - Diagnostics Setup Screen Buttons

4.8.2 Purpose of the Section

- This document describes the various diagnostics built into version **B.11** of the **BacT/Alert 3D**-instrument controller software. These diagnostics apply to the standard 3D 60 instrument.
- This document serves as design specifications for the software implementation.
- This document is also intended for persons using the diagnostics (such as field service personnel), persons writing documentation (such as the service manuals), and those writing software test plans (such as the validation test plan).

4.8.3 Special Equipment

- Several diagnostics are provided to test the various communications ports on the instrument controller. The tests require special cables/connectors, as described below.

Part Number	Description	Usage
43013-1	TOOL RS485 LOOPBACK 3D	**Loopback diagnostics for incubation module ports.** There are several options for using this part: 1) It can be plugged directly into any Incubation Module ports on the back of the Combination Module 2) or, it can be plugged into the end of the cable going to the incubation module by using 43014-1 3) or, it can be plugged into the signal distribution board using 43205-7.
43014-1	TOOL CA ASSY RS485 LOOPBACK 3D	**Loopback diagnostics for incubation module ports.** Allows 43013-1 to be connected to end of incubation module cable.
43205-7	CA ASSY BLKHD/MDL CONT	**Loopback diagnostics for incubation module ports**. Allows 43013-1 to be connected to signal distribution board.
43012-1	TOOL RS232 LOOPBACK 3D	**Loopback diagnostics for LIS, BARCODE, and MODEM ports**
43005-19	KIT, CALIBRATION/TOOL 3D & COMBO	This kit includes the part above (43013-1, 43014-1, 43205-7 and 43012-1) along with parts used for calibrating cells.

4.8.4 Accessing the Diagnostics Screens

- Starting from the **Main** screen, **click** on the [*Next*] button in the lower right corner of the screen to access the **Setup** screen.
- Using the numbered buttons at the top of the **Setup** screen, **enter** the password **<1><2><1><2><3><4><3><4>**, and **click** on the button with the **key icon** to access the **Diagnostic Selection** screen.
- **NOTE:** Any reference to "**Drawer(s)**" and/or additional "**Incubation Modules**" in the following text (or within any of the software screen capture images) is actually referring to the single Incubation Chamber of the 3D 60 instrument. Additional incubation modules cannot be added to the 3D 60 instrument.

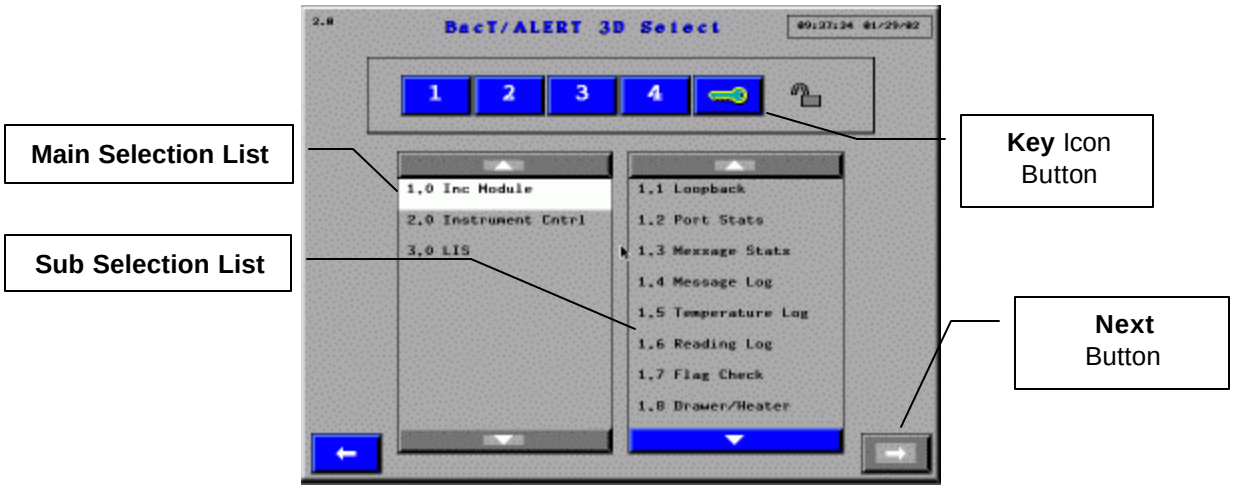


Fig. 67 - Diagnostic Test Selection (Setup) Screen

- Select the diagnostic by clicking on the corresponding lines in the two selection boxes on the screen and **press** the **right arrow** button to start the diagnostic.
- If necessary use the scroll buttons on the selection list box to locate the diagnostic then touch that line.

4.8.5 Diagnostic Screens Overview

- All diagnostics screens have the same general form. An example screen is shown below.

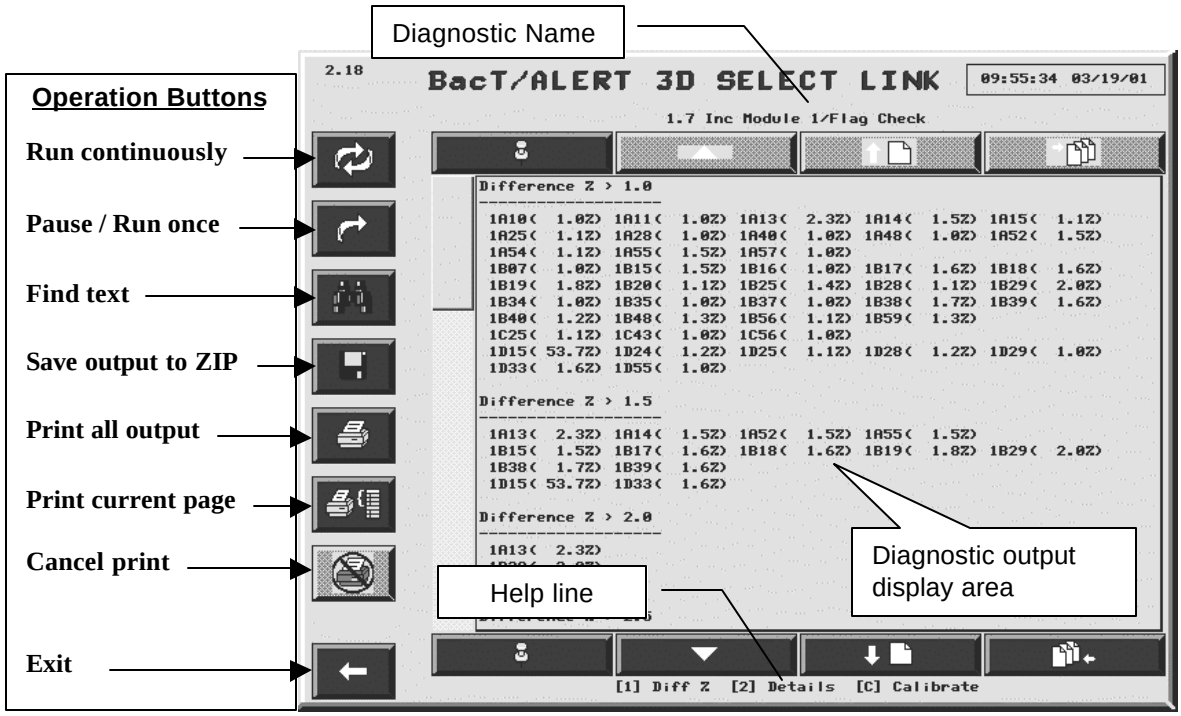


Fig. 68 - 1.7 Inc Module/Flag Check

Diagnostic Name: Displays the name of the diagnostic that is executing.

Diagnostic Output Display Area: The contents of this area depend on the particular diagnostic that is running. The diagnostic output display area can display 27 lines at a time but can actually hold up to 2000 lines of output data. Buttons just above and below the screen and the slider bar located at the left of the display area are used to scroll the data. See section titles "**Display Area Navigation"** farther down in this chapter.

Identifying Module, Racks and Cells

[**M**]	Identifies an incubation module where **M** is the module number (1)
[**MD**]	Identifies a drawer where **M** is the module number, **D** is the drawer letter (**A**)
[**MDCC-CC**]	Identifies a rack where **M** is the module number, **D** is the drawer letter, **CC-CC** is the cells belonging to that rack, e.g. 1A01-20 is the top rack in drawer **A**, 1A21-40 is the middle rack in drawer **A**, 1A41-60 is the lower rack in drawer **A**.
[**MDCC**]	Identifies a cell where **M** is the module number, **D** is the drawer letter, and **CC** is the cell number (#1-20).

Date and Time

[**DD/MM/YY HH:MM:SS**] Date and time displayed is the local time. displayed in day, month, year, hour, minute, and second order, regardless of the settings on the SET DATE/TIME menu.

Help line: Some diagnostic accept keystroke data to invoke special functions. This line displays the key and the corresponding function that key invokes.

Operation buttons: These buttons invoke operations that are common to all the diagnostics. See the table below for details.

Functionality of Diagnostics System Buttons	
Button	**Description**
Run continuously	When pressed, diagnostic runs continuously and data in the display area is updated continuously.
Pause/Run Once	If pressed, while the diagnostic is running continuously, the diagnostic is allowed to run one more time and then it is paused. Once paused, the data in the display area represents the data generated the last time the diagnostic was run. If pressed while the diagnostic is already paused, the diagnostic is allowed to run one time and updates the display data.
Find text	This function is used to find a text string in the display data. When pressed, the following screen appears.

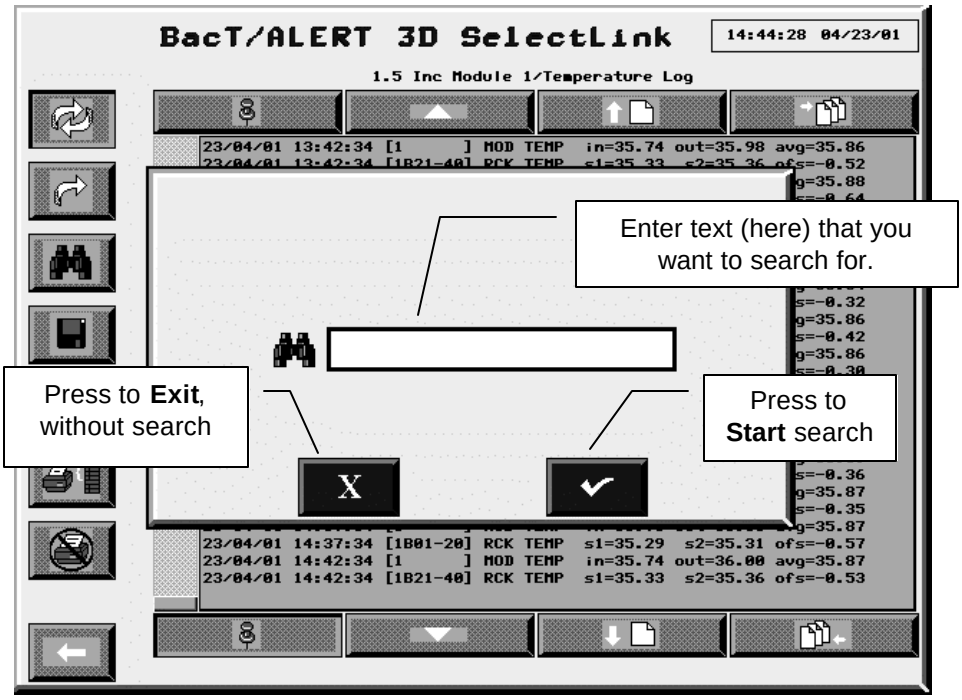


Fig. 69 - 1.5 Inc Module 1/Temperature Log (Find Text String)

For example, if the search text entered is **1B21** and the **"Check"** button is clicked, the original diagnostic screen appears and the display area is scrolled to the first instance of that text. The text is highlighted in white.

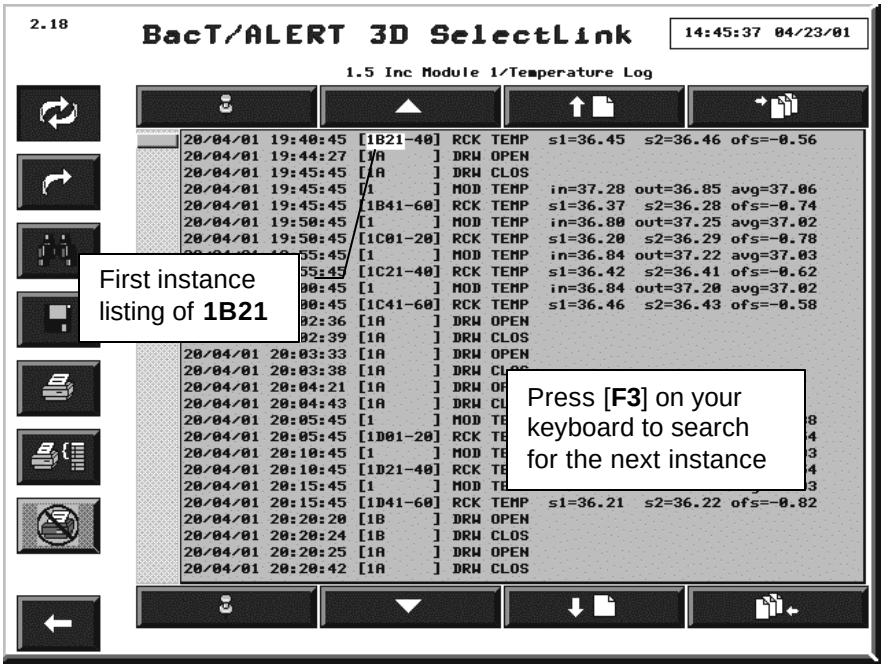


Fig. 70 - 1.5 Inc Module 1/Temperature Log (Text String Output)

To find the additional instances of the search text, press the [**F3**] function key on your keyboard. When the last instance is reached, searching automatically wraps back to the first instance of the text search.

Save output to ZIP

- This function saves diagnostic output to a text file on the Zip disk. To use this function:
- Place a ZIP disk in the instrument's ZIP drive
- Press the **Save** button. In response, the following screen will appear

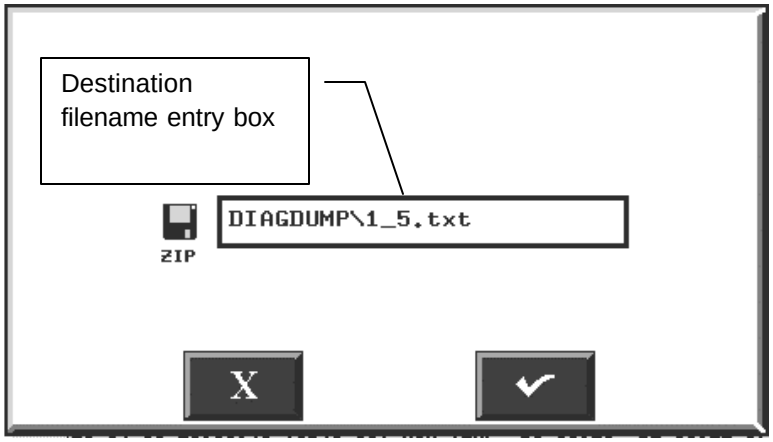
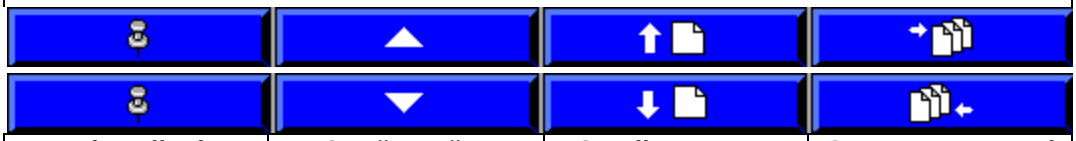


Fig. 71 - 1.5 Inc Module 1/Temperature Log (Save Output to ZIP)

	A default file name is automatically entered for you. By default the data is saved on the ZIP disk in a subdirectory named **DIAGDUMP**. The file name corresponds to the number of the diagnostic that is currently selected. If you wish to use another filename, touch the "destination filename entry box", press the **SPACE** bar to clear the box and then type in the desired name. **NOTE:** You cannot change the destination drive. It will always be the ZIP drive. NOTE: Use Only 250 M ZIP Disk To initiate the **Save**, **press** the **Check** button. To **Cancel** the save, **press** the **X** button. Operation will return to the currently selected diagnostic screen. The data is written to the file in text and so this file can be viewed using any text-editing program. For example: Windows® ***Notepad***.
Print all output	Send all lines of diagnostic output to the printer
Print current page	Send just diagnostic output lines currently displayed to the printer
Cancel print	Button is normally 'disabled', yet 'enabled' while printing is in progress. Pressing this button cancels printing.
Exit	Terminates the diagnostic, exits this screen and returns to the **Diagnostic Selection** screen

Display Output Area Navigation: The buttons, located just above and below the diagnostic output display area, allow the user to scroll through the display data.

Scroll / Anchor buttons



Anchor display (Top/Bottom)	Scroll one line (Up/Down)	**Scroll one page** (Up/Down)	**Goto Home** or **End**
Controls whether display stays anchored on the first or last line of the diagnostic output.	Moves display area one line at a time (up or down). Same function can be performed by pressing the [↑] or [↓] keys on the keyboard	Moves display area one page (up or down). Same function can be performed by pressing the [**PAGE UP**] or [**PAGE DOWN**] keys on the keyboard	Positions display area to the first or last line of the diagnostic output. Save function can be performed by pressing the [**HOME**] or [**END**] keys on the keyboard

Fig. 72 - 1.5 Inc Module 1/Temperature Log (Scroll/Anchor Buttons)

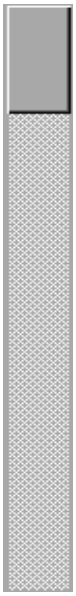
Slide bar	
	The raised section of the **Slidebar** indicates the position of the displayed data and is relative to the amount of total display data area. The size of the raised portion of the **Slide bar** is proportional to the amount of display data in relationship to the total amount of data (including scrollable data). For example, if there are 54 lines of total data and only 27 lines can be displayed at a time, the raised area would be one-half of the total size of the **Slide bar**. Touching a geographical location (top, middle, bottom, etc.) on the **Slide bar** will scroll the to same relative position in the display area. For example, if there were 2000 lines of data in the display area, and the slide bar is touched in the middle, the display area would scroll approximately to line 1000.

Fig. 73 - 1.5 Inc Module 1/Temperature Log (Slide Bar)

4.8.5 Diagnostic Screens Overview (Continued)

1 Inc Module 1

1.1 *Inc Module 1 /* ***Loopback Screen***

Special equipment	Loopback method 1: (not applicable to Combo® or 3D 60®) 1) Disconnect the cable between **IC** and **IM**, at **IM** end 2) Bring cable out to front and attach **43013-1** Loopback method 2: (required for Combo®)(not applicable to 3D 60®) 1) Attach **43013-1** to **43205-7**. 2) Access signal distribution board and remove cable from signal distribution board for **IM** port of interest 3) Connect **43013-1/43205-7** assembly
Description	This diagnoses the operation of the serial hardware used to communicate with an incubation module.
Impact	Bottle testing is unaffected for all of the incubation modules except the one whose port is being tested with this diagnostic test.
Test Procedure	a) First, enter the diagnostic test type. b) Attach loopback hardware using one of the methods described on the "**Special equipment**" row, above. c) Press [**R**] to reset fault counts d) Let the diagnostic run for 2 minutes and verify that line **4.2** shows a value of **0**. e) **Depress** the "**Power Fail**" button on the loopback test cable. Verify line **5.1** shows **1**. Release the button and verify line **5.1** shows **0**. Repeat a few times. f) **Depress** the **Event Request** button on the loopback test cable. Verify line **5.2** shows **1**. Release the button and verify line **5.2** shows **0**. Repeat a few times. g) Remove loopback hardware and reattach original hardware h) **Exit** diagnostic. **NOTE:** the **710** screen will appear momentarily. This is normal.
Keyboard functions	[**R**] – Resets counts on lines 1.1-1.5, 2.1-2.4, 3.2, 4.1, 4.2, 4.2.1, 4.2.2 to 0.
Run status	Once started, the diagnostic runs continuously and updates the display data continuously.

Fig. 74 - 1.1 Inc Module 1/Loopback Test Screen

Display values	
1.1	**Should increment -** Number of transmit buffer empty interrupts seen by serial hardware.
1.2	**Should increment -** Number of receive buffer full interrupts generated by serial hardware.
1.3	**Should remain at 0 -** Number of line status interrupts generated by serial hardware.
1.4	**Should remain at 0 -** Number of modem status interrupts generated by serial hardware. (note this interrupt is disabled as indicated on the screen)
1.5	Total of lines 1.1 through 1.4.
2.1	**Should remain at 0 -** Number of overruns reported by serial hardware. An overrun occurs if received data is not removed from the serial hardware faster than it comes in. This value should remain at 0.
2.2	**Should remain at 0 -** Number of parity errors reported by serial hardware. Parity error checking is turned off so no errors should be reported.
2.3	**Should remain at 0 -** Number of framing errors reported by serial hardware. A framing error occurs if the number of serial bits between the start and stop bit are not correct.
3.1	**This value can be ignored -** It is displayed for diagnosis of software activity and indicates whether the software's transmit data FIFO is empty or not (1 or 0 respectively
3.2	**Should remain at 0/0/0 -** Displayed for purpose of diagnosing software activity and indicateswhether there was fault storing data in the software's transmit data FIFO and where in the code that fault occurred.
4.1	**Should increment - Indicates** the number of times data loopback test was run and passed
4.2	**Should remain at 0 –** Indicates the number of times loopback test was run and failed
4.2.1	**Should remain at 0 –** Indicates the number of times loopback data was transmitted but a timeout occurred before all the data was received.
4.2.2	**Should remain at 0** – Indicates the number of times loopback data was transmitted and received but the received data did not match what was transmitted.
5.1	**Should match the state of the "power fail" button on the loopback test cable –** when that button is depressed, the value displayed should be 1, when the button is not depressed the value displayed should be 0.
5.2	**Should match the state of the "event request" button on the loopback connector –** when that button is depressed, the value displayed should be 1, when the button is not depressed the value displayed should be 0.

1.2 *Inc Module 1 / **Port Stats Screen***

Special equipment	None
Description	This diagnostic displays statistics for the serial hardware that is used to communicate with a given incubation module
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	[**R**] – Resets counts on lines 1.1-1.5, 2.1-2.4, and 3.2 to 0
Run Status	Runs continuously and updates the display data continuously

Fig. 75 - 1.2 Inc Module 1/Port Stats Test Screen

Display values	
1.1	Number of transmit buffer empty interrupts seen by serial hardware.
1.2	Number of receive buffer full interrupts generated by serial hardware.
1.3	Number of line status interrupts generated by serial hardware.
1.4	Number of modem status interrupts generated by serial hardware. (note this interrupt is disabled as indicated on the screen)
1.5	Total of lines 1.1 through 1.4.
2.1	Number of overruns reported by serial hardware. An overrun occurs if received data is not removed from the serial hardware faster than it comes in. This value should remain at 0.
2.2	Number of parity errors reported by serial hardware. Parity error checking is turned off so no errors should be reported.
2.3	Number of framing errors reported by serial hardware. A framing error occurs if the number of serial bits between the start and stop bit are not correct.
3.1	Indicates whether the software's transmit data FIFO is empty or not (1 or 0 respectively)
3.2	Indicates whether there was fault storing data in the software's transmit data FIFO and where in the code that fault occurred.

1.3 *Inc Module 1 /* ***Message Stats Screen***

Special equipment	None
Description	Displays statistics related to messages exchanged between the instrument controller and incubation module. Also displays statistics related to incubation module *power faults* and *event requests*.
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	[**R**] – Resets counts on all lines.
Run Status	Runs and updates display values continuously.

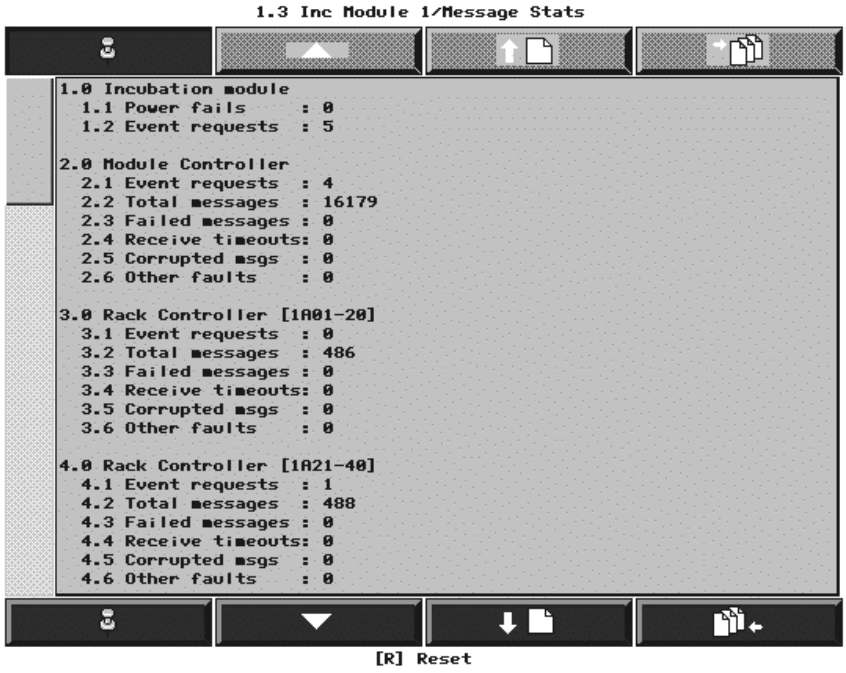


Fig. 76 - 1.3 Inc Module 1/Message Stats Test Screen

Display values	
1.1	Number of times incubation module reported a power fail condition
1.2	Number of event requests received from the incubation module.
2.1	Number of event requests generated by the module controller (should be the same as 1.2)
2.2	Number of messages exchanged between instrument controller and module controller
2.3	Number of messages exchanged with module controller with any problem
2.4	Number of messages sent to module controller where the expected response did not occur in the required time
2.5	Number of responses from the module controller that had a checksum error
2.6	Number of message exchanges with the module controller that fail for some reason other than timeouts or corruption
3.1	Number of event requests generated by the rack controller 1
3.2	Number of messages exchanged between instrument controller and rack controller 1
3.3	Number of messages exchanged with rack controller 1 with any problem
3.4	Number of messages sent to rack controller 1 where the expected response did not occur in the required time
3.5	Number of responses from the rack controller 1 that had a checksum error
3.6	Number of message exchanges with the rack controller 1 that fail for some reason other than timeouts or corruption
	Remaining sections duplicate the information in 3.1 thru 3.7, but apply to the racks 2 thru 12 respectively

1.4 *Inc Module 1* / ***Message Log Screen***

Special equipment	None
Description	Displays the recent history of commands and responses exchanged between the instrument controller and incubation module.
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	None
Run status	Runs continually and adds new messages to the end of the display as they occur

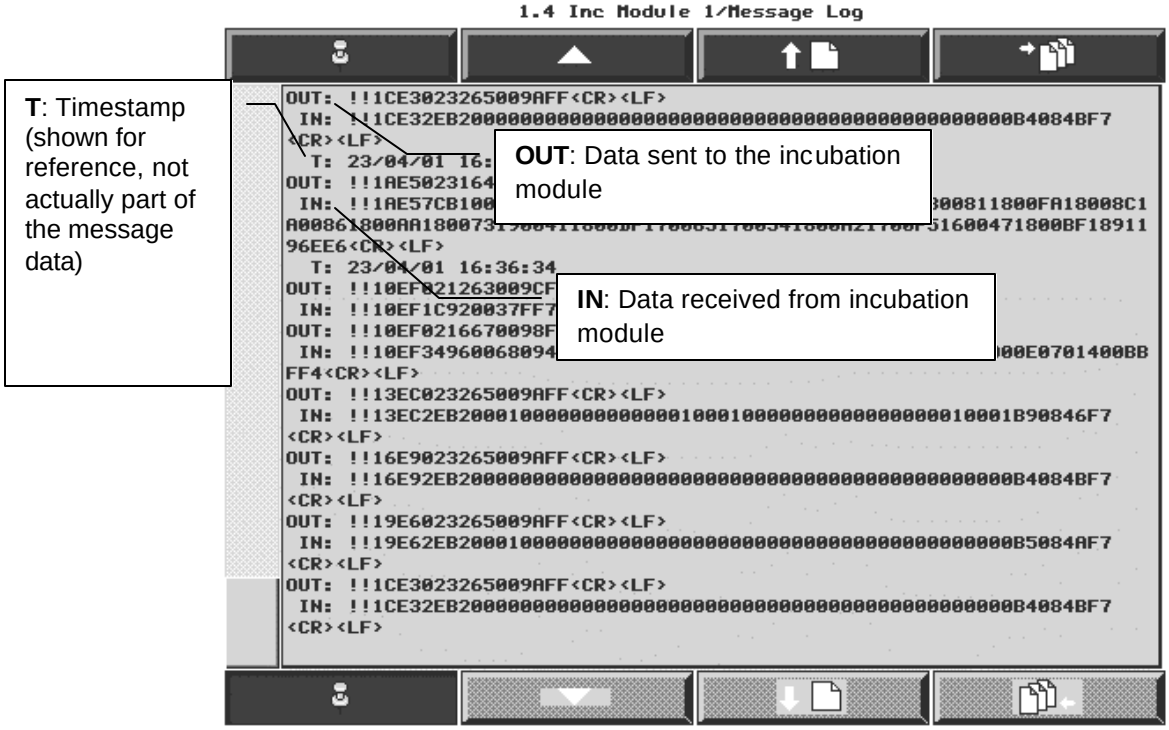


Fig. 77 - 1.4 Inc Module 1/Message Log Test Screen

1.5 *Inc Module 1* / ***Temperature Log Screen***

Special equipment	None
Description	Display history or heater temperature sensors and sensor on the racks
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	None
Run status	Runs continually and adds new temperature readings to end of display as they occur.

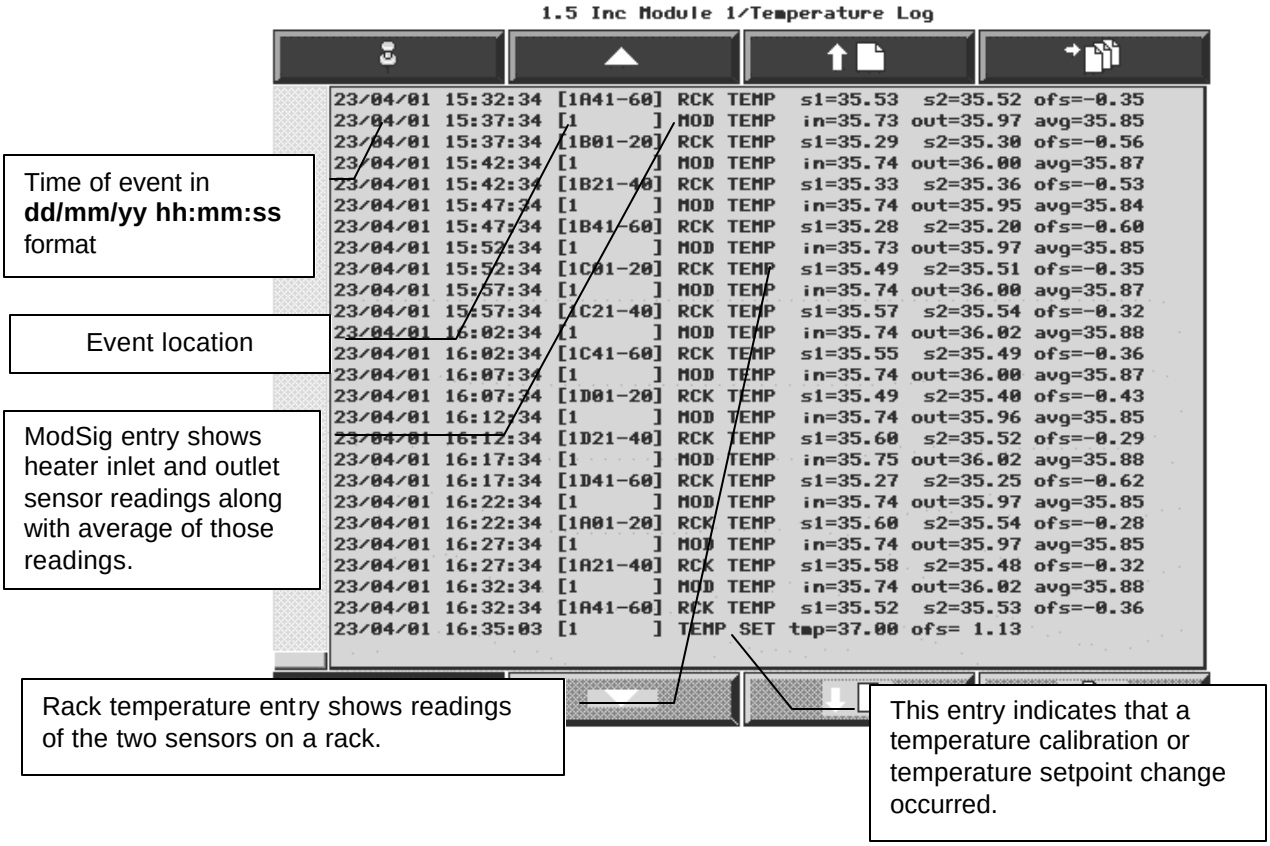


Fig. 78 - 1.5 Inc Module 1/Temperature Log Test Screen

Door open (**DOOR OPEN**) and Close (**DOOR CLOS**) events are also displayed, but not shown in the example above.

MOD TEMP events are logged every 5 minutes

RCK TEMP events are logged once an hour with a 5-minute interval between racks. (i.e. rack1 at time 0, rack 1 at 5 min., rack 2 at 10 min. and so on)

DOOR OPEN and **DOOR CLOS** events are logged when they occur

TEMP SET events are logged when they occur

1.6 *Inc Module 1 /* ***Reading Log Screen***

Special equipment	None
Description	Displays recent history of readings taken
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	None
Run status	Run continually and adds new readings to end of display as they occur

Displays the most recent readings taken on incubation module cells. Each line of the display identifies each cell the reading was taken from, followed by:

- the status of the cell: **LOAD**, **UNLOAD**, **OUT OF CAL**
- the reading
- the number of the polynomial used to normalize the reading

The following reading values indicate a fault condition and you will see a **51-57** fault reported on the operator screen.

20000: polynomial **0** used but not initialized
21000: polynomial **1** used but not initialized
22000: polynomial **2** used but not initialized
23000: polynomial **3** used but not initialized
-30000 or
30000: normalized reading too large

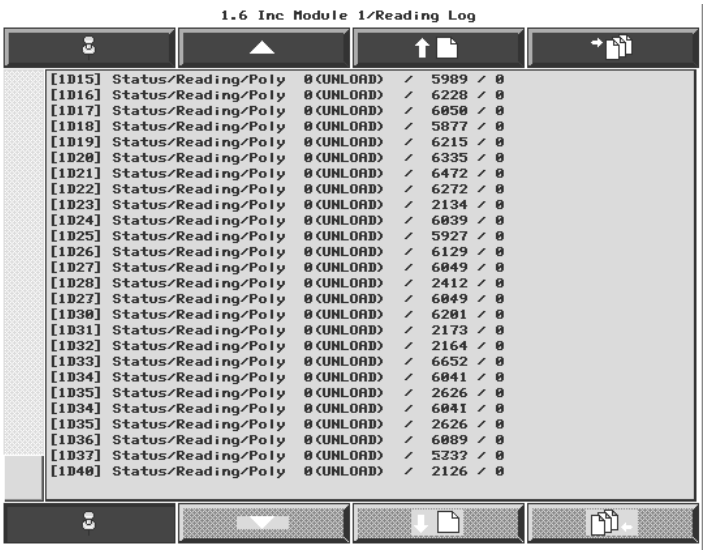


Fig. 79 - 1.6 Inc Module 1/Reading Log Test Screen

1.7 *Inc Module 1 /* ***Flag Check Screen***

Special equipment	None
Description	This diagnostic gathers calibration information for all the cells in an incubation module. Specifically, the current flag reading and the flag reading at calibration time are obtained. The percentage difference (**Delta**) between the current and calibrated readings is calculated and displayed.
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	a) Enter this diagnostic b) When the "**diff %**" (**Delta**) data appears, scroll up to find the cells in the "**Difference > 1.5%**" group. c) For each of the cells listed in this group, perform a single cell calibration **NOTE:** you can enter the calibration screen by pressing "**C**" from the diagnostic screen.
Output	
Keyboard functions	[**1**] Display the percentage difference screen [**2**] Display the details screen [**C**] Enter the calibration screen
Run status	The diagnostic automatically stops running once it has gathered all the required readings and the run button will be in the unpressed state. Pressing the run button restarts the diagnostic. It will gather new readings and then display the "**diff %**" data.

When first entered, or whenever the diagnostic is restarted (**RUN** button pressed), the diagnostic gathers readings from the racks in the incubation module. It takes several seconds to gather all of the data. So, the rack that is being processed is indicated, as shown in the adjacent picture.

If a rack is not installed or a drawer is not installed, they are skipped and do not appear in the display.

During the "gathering" phase, keyboard input is ignored.

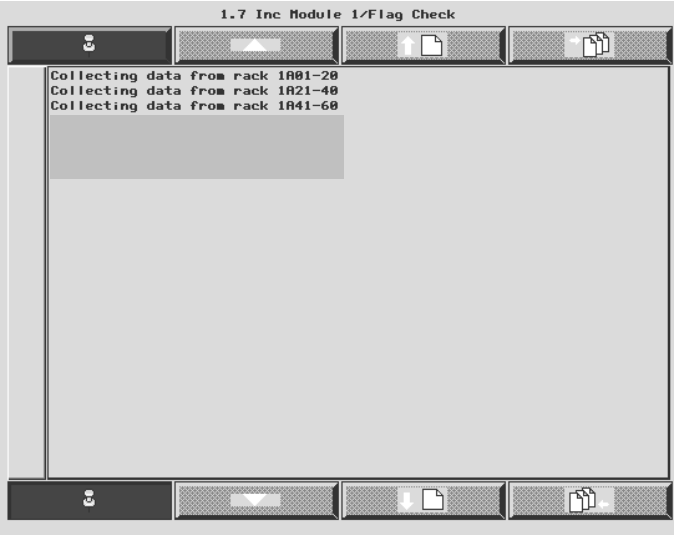


Fig. 80 - 1.7 Inc Module 1/Flag Check Screen

Once all of the required data is gathered, the "**diff %**" data is displayed (as shown on the adjacent screen).

This screen groups the cells by the amount (**Delta**) that their flag reading differs from its expected reading (i.e. the flag value when the cell was calibrated).

A given cell may appear in multiple groups. For example, a cell whose difference is 1.5% will appear in the **1.0%** and **1.5%** groups. Groupings are shown for percentages of 0.5%, 1.0%, 1.5%, and so on, up to 10%

No data is displayed for cells that are loaded, since a flag reading cannot be taken on those cells. No data is displayed for cells in racks or drawers that are uninstalled.

Note that keyboard input is accepted at this point. Pressing the [**C**] key brings up the **Calibration** screen, as shown below. In this manner a cell can be calibrated without leaving the diagnostic screen. When the **Exit** [**X**] button is pressed on the calibration screen, operation returns to the **Flag Check** diagnostic screen.

Pressing [#**2**] key causes detailed data to be displayed. This data shows the current flag reading, the expected flag reading, and the difference and percentage difference for each cell. If a cell is loaded, the word "**LOAD**" is shown on the current reading line. Pressing the [#**1**] key returns to the "**diff %**" display, or the [**C**] can be pressed to bring up the Calibration screen.

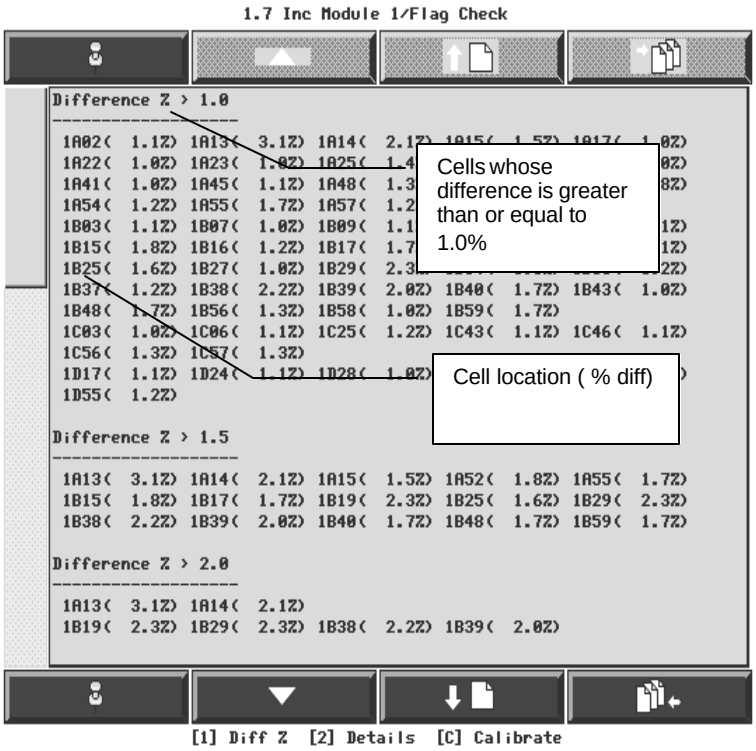


Fig. 81 - 1.7 Inc Module 1/Flag Check Test Screen

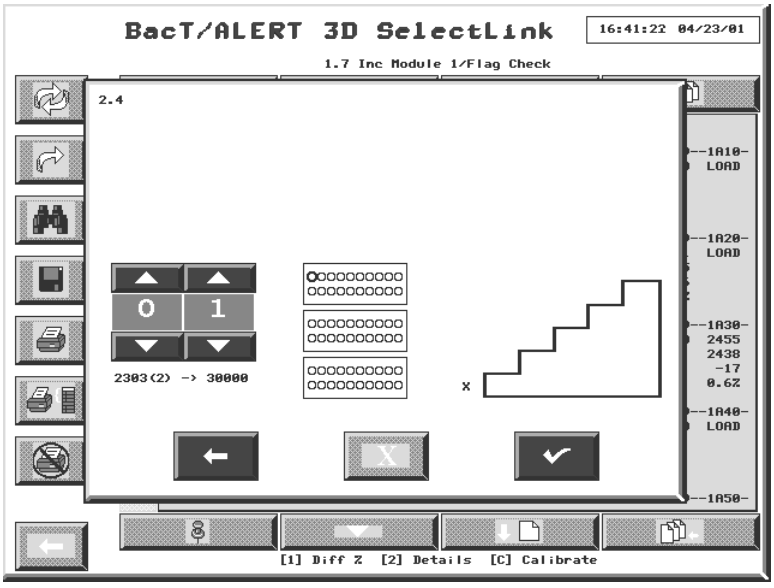


Fig. 82 - 1.7 Inc Module 1/Flag Check (Calibration Screen)

To restart the diagnostic and gather new readings, press the button… Or exit the diagnostic and reenter it.

1.8 *Inc Module 1* / ***Incubation Heater Screen***

Special equipment	None
Description	This diagnostic displays the state of the drawer switch and heater function in an incubation module.
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	None
Run status	Runs continuously and updates the display continuously

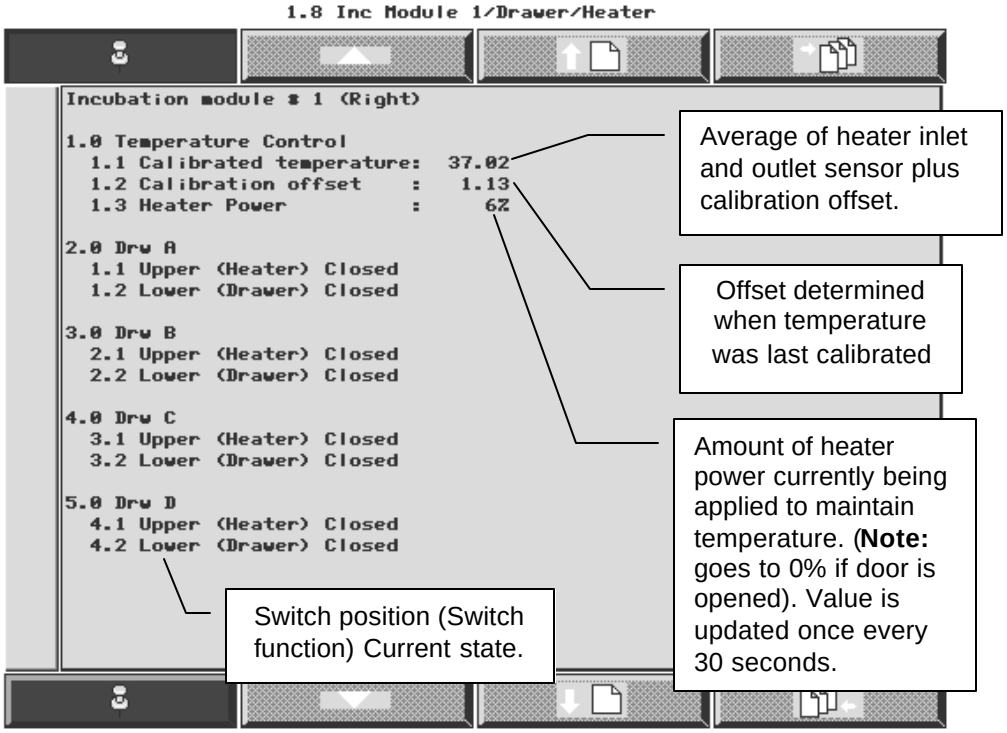


Fig. 83 - 1.8 Inc Module 1/Heater Screen

1.9 *Inc Module 1* **/ *LED Check Screen***

Special equipment	None
Description	This diagnostic provides a way to turn all the LEDs (both drawer and cells) **ON** and also to blink them in a pattern to verify that they all work and that no LEDs are shorted together.
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	a) Enter the diagnostic b) Open the door and verify that all cell LEDS are **ON**. c) **Press** the [**2**] key d) Open the door and verify from the **Walking** pattern that only one cell LED turns on at a time for the top rack. Verify the same for the middle rack and then the lower rack.
Keyboard functions	[1] Turns on all LEDS [2] Initiates the **Walking LED** pattern
Run status	Diagnostic runs continuously and updates the display continuously.

Upon initial entry to diagnostic, all LEDs are turned on and the display appears as shown in the adjacent picture.

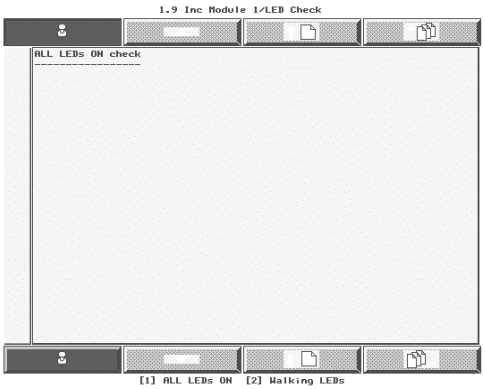


Fig. 84 - 1.9 Inc Module 1/LED Check

Pressing [**2**] initiates the **Walking LED** test and the display appears as shown in the adjacent picture.

The displayed data indicates which LED should be on.

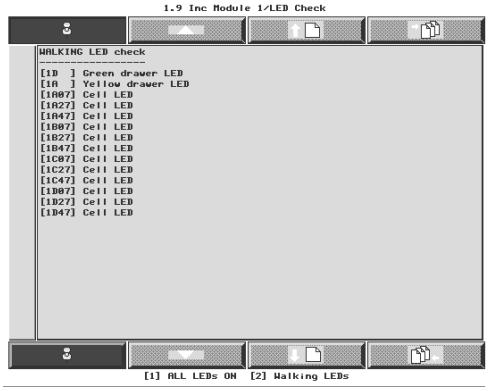


Fig. 85 - 1.9 Inc Module 1/LED Check (Walking)

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7 INSTRUMENT CNTRL

7.1 *INSTRUMENT CNTRL / **ZIP Drive Test Screen***

Special equipment	None
Description	This verifies that data can be written to (and read from) the ZIP drive
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	a) Remove ZIP disk from ZIP drive and replace with known good ZIP disk b) Start diagnostic c) Let run for at least 2 minutes d) Verify that no **FAIL** counts are displayed e) **Exit** diagnostic f) Put the original ZIP disk back into ZIP drive
Keyboard functions	Press **R** to reset counts
Run status	Run continuously and updates the display continuously

The ZIP drive test consist of the following steps:

a) Clear the pass and fail counters.
b) Open a file on the ZIP disk. If the file can't be opened, increment the "**open error counter**" (line 2.1)
c) Write garbage to the file
d) Go back to the start of the file and write the current date and time. If an error is generated while writing, increment the "**write error counter**". (line 2.3)
e) Go back to the start of the file and read the data. If an error is generated while reading the data or the data does not match what was written, increment the "**read error counter**" (line 2.2)

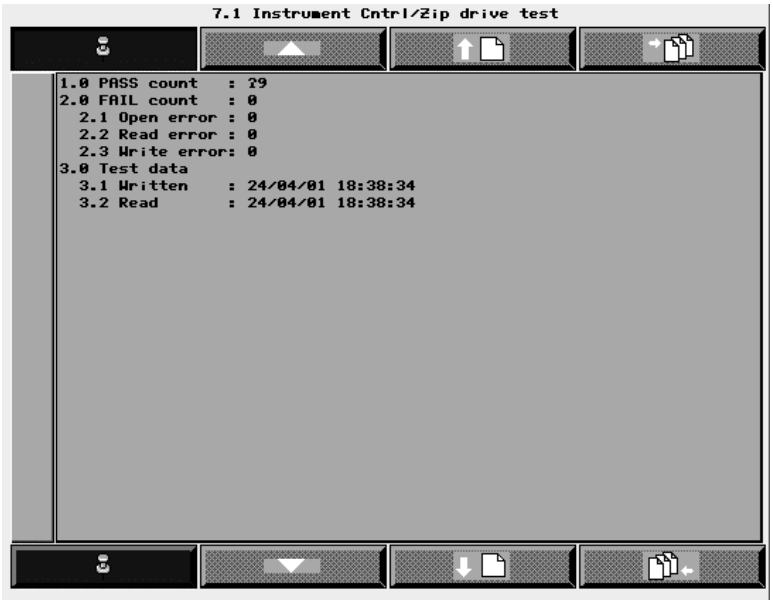

Fig. 86 - 7.1 Instrument Cntrl/Zip Drive Test Screen

f) Close the file
g) Repeat steps "**b**" thru "**f**", above, until the diagnostic is terminated.

Display values	
1.1	Number of times test was run without any errors
2.1	Number of times test was run and test file could not be opened
2.2	Number of times test was run and an error occurred while writing
2.3	Number of times test was run and an error occurred while reading the data or the data did not match what was written.
2.4	Number of times an error was generated while trying to write the test data.
3.1	Last test data string written to test file on ZIP disk.
3.2	Last data read back from test file on ZIP disk.

7.2 *INSTRUMENT CNTRL* / ***Barcode Loopback Screen***

Special equipment	PN 43012-1
Description	This diagnostic verifies the operation of the serial hardware that makes up the interface to the bar code scanner. It isolates problems to either the barcode scanner or instrument controller.
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	a) Access the signal distribution board b) Replace the barcode scanner connector from the connector on the signal distribution board with loopback connector **PN 43012-1** • Start diagnostic • Let run for a period of 2 minutes c) Verify that **FAIL count** on **4.2** is **0**. d) **Exit** diagnostic e) Remove loopback connector and reattach barcode scanner
Keyboard functions	[**R**] – Resets values on lines 1.1-1.5, 2.1-2.4, 3.2, 4.1, 4.2, and 4.2.1 thru 4.2.4 to 0.
Run status	Runs continuously and updates the display continuously

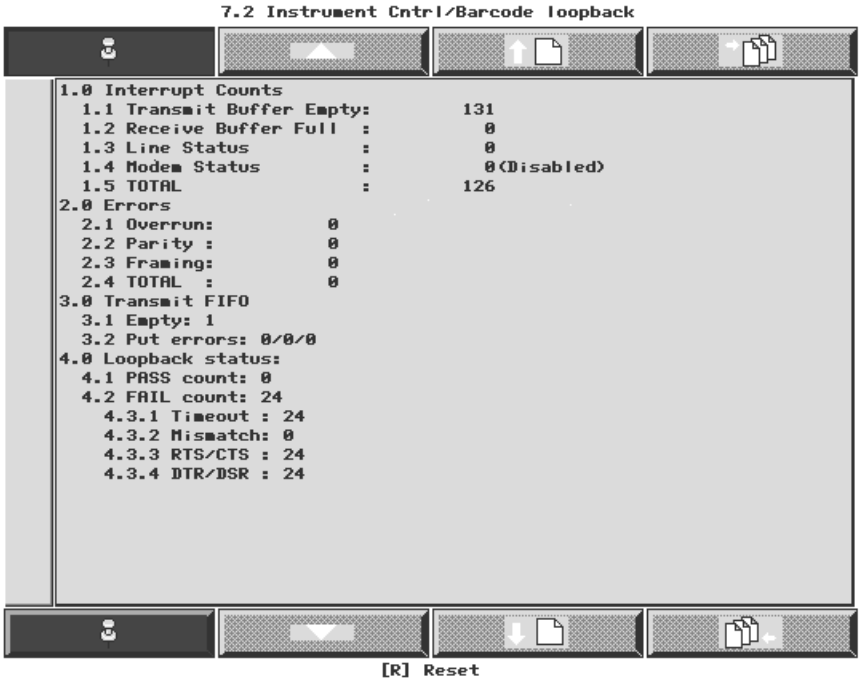

Fig. 87 - 7.2 Instrument Cntrl/Barcode Loopback Test Screen

Display values	
1.1	**Should increment -** Number of transmit buffer empty interrupts seen by serial hardware.
1.2	**Should increment -** Number of receive buffer full interrupts generated by serial hardware.
1.3	**Should remain at 0 -** Number of line status interrupts generated by serial hardware.
1.4	**Should remain at 0 -** Number of modem status interrupts generated by serial hardware. (note this interrupt is disabled as indicated on the screen)
1.5	Total of lines 1.1 through 1.4.
2.1	**Should remain at 0 -** Number of overruns reported by serial hardware. An overrun occurs if received data is not removed from the serial hardware faster than it comes in. This value should remain at 0.
2.2	**Should remain at 0 -** Number of parity errors reported by serial hardware. Parity error checking is turned off so no errors should be reported.
2.3	**Should remain at 0 -** Number of framing errors reported by serial hardware. A framing error occurs if the number of serial bits between the start and stop bit are not correct.

3.1	**This value can be ignored -** It is displayed for diagnosis of software activity and indicates whether the software's transmit data FIFO is empty or not (1 or 0 respectively
3.2	**Should remain at 0/0/0 -** Displayed for purpose of diagnosing software activity and indicates whether there was fault storing data in the software's transmit data FIFO and where in the code that fault occurred.
4.1	**Should increment - Indicates** the number of times data loopback test was run and passed
4.2	**Should remain at 0 –** Indicates the number of times loopback test was run and failed
4.2.1	**Should remain at 0 –** Indicates the number of times loopback data was transmitted but a timeout occurred before all the data was received.
4.2.2	**Should remain at 0** – Indicates the number of times loopback data was transmitted and received but the received data did not match what was transmitted.
4.2.3	**Should remain at– Just** before transmitting loopback data, the four possible combinations or signal states are asserted on the RTS and DTS lines. The state of the CTS line which is connected to the RTS line is monitored and if found inconsistent with the assert RTS/DTS signals, this count is incremented.
4.2.4	**Should remain at 0** – Just before transmitting loopback data, the four possible combinations or signal states are asserted on the RTS and DTS lines. The state of the DSR line which is connected to the DTR line is monitored and if found inconsistent with the assert RTS/DTS signals, this count is incremented.

7.3 *INSTRUMENT CNTRL / **Modem Loopback Screen***

Special equipment	P/N 43012-1
Description	This diagnostic verifies that the operation of the serial hardware that makes up the interface to the external modem. It isolates problems to either the external modem or instrument controller.
Impact	Bottle test is not affected by this diagnostic
Test Procedure	a) Replace the modem cable connector at the instrument controller end with the loopback connector **P/N 43012-1** b) Start diagnostic c) Let run for a period of 2 minutes d) Verify that **FAIL** count on **4.2** is **0**. e) **Exit** diagnostic f) Remove loopback connector and reattach modem cable
Keyboard functions	None
Run status	Runs continuously and updates the display continuously

NOTE: Displayed data is the same shown for the barcode loopback test – (Refer to Section 7.2).

7.4 *INSTRUMENT CNTRL* / ***Power event log screen***

Special equipment	None
Description	Shows recent history of **power events,** including **power faults**, in the instrument controller and incubation module
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	None
Run status	Runs continuously and updates the display continuously

Fig. 88 - 7.4 Instrument Cntrl/ Power Even Log Screen

Events that appear in the log (but not necessary shown in the example above) are:

INSTR CNTRL AC (power fault) – **Note:** this is logged when AC power fails and returns as reported by the UPS. Instrument will do a controlled shutdown.
INSTR CNTRL UPS (battery low) - **Note:** this is logged when reported by the UPS.
MODULE POWER FAULT – this is logged when incubation chamber asserts its **power fault** signal.
MODULE POWER UP – this is logged when incubation chamber negates its **power fault** signal, or whenever the instrument software is started.
RACK POWER UP – this is logged when rack reports a **power up** event, or whenever the instrument software is started.

7.5 *INSTRUMENT CNTRL / **View files screen***

Special equipment	None
Description	Allows contents of selected files to be viewed
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	Selects the file that is to be viewed [**1**] – All the **.INI** files [**2**] All the **.BID** files [**3**] All the **.BTF** files [**4**] All the **.APF** files [**5**] – All the event log files (**LOG*.EVT**) [**6**] the preload data file (**PLDSTORE.DAT**
Run status	Runs once and stops

[1] **.INI** files

For each file on the **c:\ drive** of the Flash card with an **.INI** extension, the file name is displayed, followed by a row of dashes, followed by the contents of the file.

```
FILE : BTA3D.INI
------------------------------------------------------------
[InstrCntrl]
 Type = STD
 ;DeskRed = 148
 ;DeskGreen = 84
 ;DeskBlue = 120
 InhibitCommHoldoffTime = 120

 [UserIntf]
 FaultReminderPeriod = 300
 DrawerOpenFaultPeriod = 300

 [Printer]
 Type = HP
 PaperSize = LTR

 [BottleID]
 FirstCharAlpha = 1
 FirstCharNumeric = 0
 FirstCharOther = 1
 AlertIfGeneric = 1

 [AccessionNum]
 MinLength = 0
 MaxLength = 0
 FirstCharAlpha = 0
 FirstCharNumeric = 1
 FirstCharOther = 0
 Lifetime = 30
 ForceUppercase = 0

 [HOSPITALID]
 ForceUppercase = 1

 [PATIENTNAME]
 ForceUppercase = 1

 [MODEM]
 BaudRate = 38400


FILE : EXTCOMP.INI
------------------------------------------------------------
[DBMS]
 Enabled = 0

 [LIS]
 Enabled = 1
 BidirectionalLink = 1
 TestOrderPollPeriod = 120
 AutoTransmitResults = 180
 PeriodicallyTestLink = 240
 Parity = NONE
 BaudRate = 2400
 BitsPerChar = 8
 StopBits = 1
```

Example

[2] .BID files

Similar to 7.5.1 with the exception that files in the **c:\btlprocs** directory with a **.BID** extension are displayed.

[3] .BTF files

Similar to 7.5.1 with the exception that files in the **c:\btlprocs** directory with a **.BTF** extension are displayed.

[4] .APF files

Similar to 7.5.1 with the exception that files in the **c:\btlprocs** directory with a **.APF** extension are displayed.

[5] LOG files

Similar to 7.5.1 with the exception that files in the \LOG directory, specifically EVENT14.LOG, EVENT13.LOG and so on to EVENT0.LOG are displayed. EVENT0.LOG contains the most recent data and appears at the bottom of the display. EVENT14.LOG contains the oldest data and appears at the top of the displayed. If there is more log data than can be displayed, the oldest log data is omitted from the display. An example is shown below followed by details on what the contents of .LOG file mean.

```
FILE : EVENT1.LOG
-----------------------------------------------------------------
!! 139719250(06/06/01 08:04:34) 0x38(DTChg) 4294948672
!! 139719253(06/06/01 08:04:37) 0x4(ICFlt) 0
!! 139719253(06/06/01 08:04:37) 0x3(IMFlt) 1 0 0 0 0 0
!! 139719253(06/06/01 08:04:37) 0x3(IMFlt) 2 0 0 0 0 0
!! 139719253(06/06/01 08:04:37) 0x3(IMFlt) 3 0 0 0 0 0
!! 139719253(06/06/01 08:04:37) 0x3(IMFlt) 4 0 0 0 0 0
!! 139719253(06/06/01 08:04:37) 0x3(IMFlt) 5 0 0 0 0 0
!! 139719253(06/06/01 08:04:37) 0x3(IMFlt) 6 0 0 0 0 0
!! 139719258(06/06/01 08:04:42) 0x30(IMPwr) 1
!! 139719258(06/06/01 08:04:42) 0x30(IMPwr) 2
!! 139719535(06/06/01 08:09:19) 0x4(ICFlt) 12
!! 139721277(06/06/01 08:38:21) 0x38(DTChg) 4294948672
!! 139721279(06/06/01 08:38:23) 0x4(ICFlt) 0
!! 139721280(06/06/01 08:38:24) 0x3(IMFlt) 1 0 0 0 0 0


FILE : EVENT0.LOG
-----------------------------------------------------------------
!! 139809948(07/06/01 09:16:12) 0x38(DTChg) 4294948672
!! 139809951(07/06/01 09:16:15) 0x4(ICFlt) 0
!! 139809951(07/06/01 09:16:15) 0x3(IMFlt) 1 0 0 0 0 0
!! 139809951(07/06/01 09:16:15) 0x3(IMFlt) 2 0 0 0 0 0
!! 139809951(07/06/01 09:16:15) 0x3(IMFlt) 3 0 0 0 0 0
!! 139809951(07/06/01 09:16:15) 0x3(IMFlt) 4 0 0 0 0 0
!! 139809951(07/06/01 09:16:15) 0x3(IMFlt) 5 0 0 0 0 0
!! 139809951(07/06/01 09:16:15) 0x3(IMFlt) 6 0 0 0 0 0
!! 139809956(07/06/01 09:16:20) 0x30(IMPwr) 1
!! 139809956(07/06/01 09:16:20) 0x30(IMPwr) 2
!! 139810161(07/06/01 09:19:45) 0x4(ICFlt) 12
!! 139810363(07/06/01 09:23:07) 0x3(IMFlt) 2 0 0 74 0 0
!! 139811149(07/06/01 09:36:13) 0x4(ICFlt) 0
!! 139812682(07/06/01 10:01:46) 0x38(DTChg) 4294948672
!! 139812694(07/06/01 10:01:58) 0x4(ICFlt) 0
!! 139812695(07/06/01 10:01:59) 0x3(IMFlt) 1 0 0 0 0 0
!! 139812695(07/06/01 10:01:59) 0x3(IMFlt) 2 0 0 0 0 0
!! 139812695(07/06/01 10:01:59) 0x3(IMFlt) 3 0 0 0 0 0
!! 139812695(07/06/01 10:01:59) 0x3(IMFlt) 4 0 0 0 0 0
!! 139812695(07/06/01 10:01:59) 0x3(IMFlt) 5 0 0 0 0 0
!! 139812695(07/06/01 10:01:59) 0x3(IMFlt) 6 0 0 0 0 0
!! 139812700(07/06/01 10:02:04) 0x30(IMPwr) 2
!! 139812700(07/06/01 10:02:04) 0x30(IMPwr) 1
!! 139813009(07/06/01 10:07:13) 0x3(IMFlt) 1 0 20 0 0 0
!! 139813053(07/06/01 10:07:57) 0x3(IMFlt) 1 0 0 0 0 0
!! 139813314(07/06/01 10:12:18) 0x3(IMFlt) 1 0 99 0 0 0
!! 139813764(07/06/01 10:19:48) 0x3(IMFlt) 1 0 51 0 0 0
```

Each line in an event log has the same format as follows:

```
!! 127829789(18/01/01 13:24:00) 0x38(DTO) 82349
     seconds   dd/mm/yy hh:mm:ss    event info
```

The event info content varies (depending on the kind of event) and is described below.

Software exception	Exception details
0x1(SWExc)	**LOG,TEST,MAIN**
This event occurs if there is a condition, for example a hardware problem that the software cannot handle, or there is a design flaw in the software that results in a condition that cannot be handled. Report this information to the 3D software development team.	

Incubation module fault	Module Number	Module Fault code	Drawer A Fault code	Drawer B Fault code	Drawer C Fault code	Drawer D Fault code
0x3(IMFlt)	**3**	**0**	**41**	**0**	**0**	**0**
This information corresponds to information displayed on the Main Screen's incubation chamber pictorial. A fault code of **0** means there is no fault in the chamber. See Operator's Manual or Quick Reference card for the meaning of non-zero fault codes						

Instrument Controller fault	Fault Code
0x4(ICFlt)	**10**
This information corresponds to information displayed on the Main Screen's instrument controller pictorial. A fault code of **0** means there is no fault. See Operator's Manual or Quick Reference card for the meaning of non-zero fault codes.	

Module power up	Module Number
0x30(IMPwr)	**2**
This event indicates that the incubation chamber has just powered up.	

Display time offset change	Offset in seconds
0x38(DTChg)	**16432**
Internally, the 3D software maintains time in GMT time. When the operator uses the **Set Date/Time** screen to enter the local time, the difference between local time and GMT is calculated and this event is logged to record that difference. This event is an indication that the operator has changed the date or time.	

Cell QC fault	Module Number	Drawer Number	Rack Number	Cell Number	Fault present
0x39(QCFlt)	**3**	**2**	**3**	**12**	**1**

This event is logged anytime a cell goes out of calibration or back into calibration (presumably because the operator has calibrated the cell).

The "**Drawer Number**" value range **1** and corresponds with drawer **A**, only.

The "**Rack Number**" ranges from **1** to **3** and corresponds with the **top rack**, **middle rack** , and **bottom rack** , respectively.

The "**Cell Number**" ranges from **1** to **20** and identifies the affected cell. The cell number that the operator sees depends on "**Rack Number**". For example, if Rack Number is **2** and Cell Number is **5**, the operator would see this as cell **25**. If the Rack Number is **3** and the Cell Number is **10**, the operator would see this as cell **50**.

If the "**Fault present**" value is **1**, the cell is out of calibration. If **0**, then the cell has been calibrated

Backup started	
0x100(BkupStart)	
This event is logged any time a backup has started.	

Backup completed successfully	
0x101(BkupOk)	
This event is logged any time that a backup is completed successfully	

Backup failed	
0x102(BkupFailed)	
This event is logged any time that a backup has started but failed to complete successfully	

Operator cell calibration started	Module Number	Drawer Number	Rack Number	Cell Number
0x300(CCalSt)	**3**	**2**	**3**	**12**
This event is logged any time that the operator starts a single cell calibration				

Operator cell calibration successful	Module Number	Drawer Number	Rack Number	Cell Number
0x301(CcalOK)	**3**	**2**	**3**	**12**
This event is logged any time that the operator successfully completes single cell calibration				

Instrument controller power up	
0x600(ICPwr)	
This event is logged any time that the instrument controller is powered up	

Normal shutdown	
0x200(NrmSD)	
This event is logged any time that the software is shutdown in the normal fashion	

Power loss shutdown	
0x201(PwrLossSD)	
This event is logged any time that the software is shutdown due to a loss of power	

Abnormal shutdown without NVRAM save	Shutdown comment
0x202(AbNrmSD)	**CPU NVRAM has uninitialized data or file read error**
This event is logged any time that the software is shutdown for an abnormal reason without saving the NVRAM. For example, if during power up the software detects that the CPU NVRAM is unitialized, the software is abnormally shutdown without saving the NVRAM	

SMX error at startup shutdown	
0x203(SmxErrSD)	
This event is logged any time that the software is shutdown because of an SMX error detected at startup.	

Abnormal shutdown with NVRAM save	Shutdown comment
0x204(AbNrmSD)	**DEBUG MODE - immediate shutdown with NVRAM save**
This event is logged any time that the software is shutdown for an abnormal reason with saving the NVRAM. For example, if the software is started with the appropriate debug mode for immediate shutdown configuration set, the software shuts down abnormally, but saves the NVRAM.	

Remote User requests shutdown	
0x205(RemUserSD)	
This event is logged any time that the software is shutdown because of a request passed by the Remote User software.	

Set the setpoint temperature	Module Number	New Setpoint
0x500(MTSet)	**1**	**37.0**
This event is logged any time that the set point has been changed		

Module temperature offset at power up	Module Number	Temperature Offset
0x501(IMOfs)	**1**	**-.42**
This event is logged any time that the incubation chamber is powered up		

Module temperature offset updated	Module Number	Temperature Offset
0x502(IMOfs)	**1**	**-.42**
This event is logged any time that the incubation chamber's temperature is updated		

Module temperature calibrated	Module Number	Current Temperature	Last Stable Temperature	Temperature Offset
0x503(IMTCal)	**1**	**36.00**	**36.86**	**-1.36**
This event is logged any time that the incubation chamber's temperature is calibrated				

Remote User software connection detected	
0x700(RUOn)	
This event is logged any time that the software detects that the Remote User sof tware has connected.	

Remote User software connection dropped	
0x701(RUOff)	
This event is logged any time that the software detects that the Remote User software connection has been dropped.	

7.6 *INSTRUMENT CNTRL* / ***Software Screen***

Special equipment	None
Description	Displays data used to debug, verify and validate instrument software. Also, displays logs of exception conditions detected by the software.
Impact	Bottle testing is not affected by this diagnostic
Test Procedure	N/A
Keyboard functions	Selects the specific type of information to display [**1**] Software debug information [**2**] Software exception log [**3**] Operating system exception log [**4**] Modem activity log [**5**] Association tables [**6**] Bottle processing tables [**7**] Configuration tables [**8**] Other
Run status	Runs continually and updates display when new information needs to be displayed.

[1] Debug

Displays software debug messages intended for development activity and is intended for the 3D software development team. The format and content messages put in this log are left up the software implementer and no design specifications are imposed.

[2] Software exception log

Displays software exceptions messages intended for the 3D software development team. Access this screen if a **19** fault code is being displayed on the main screen. The format and content messages put in this log are left up the software implementer and no design specifications are imposed.

When a software exception is detected, a fault code 19 is displayed on the main screen. While the software exception log is being displayed, pressing CTRL-R clears the fault 19 and a short beep will sound on the speaker.

Note: Clearing the fault does not fix the problem – Contact Global Customer Service, as soon as possible.

[3] Operating system exception log

Displayed exceptions reported by the 3D operating system (SMX). The format and content messages put in this log are determined by the operating system vendor (Micro Digital) and no design specifications are imposed.

[4] Modem activity log

Displays software debug messages intended for development activity and is intended for the 3D software development team. The format and content messages put in this log are left up to the software implementer and no design specifications are imposed.

[5] Association tables

Displays current content of various dictionaries and association tables used to keep track of bottle and pre-load data. An example of the **Association** screen content is shown below. Explanatory comments are shown in *italics* and do not actually appear on the diagnostic screen.

```
--- Patient Name Dictionary ---        relates a hospital ID to the patient name
    17, AH3HID,                        hash table index, hosptial id, first name, last name
    18, AH4HID, AH4FIRST AH4LAST

--- HID to Acc Container ---           relates hospital ID to accessions that share that hid
    17, AH3HID, AH3ACC*8895AFA         hash table index, hid, accession
    18, AH4HID, AH4ACC*1

--- ACC to HID Dictionary ---          relates accession back to its hospital ID
    83, AH3ACC*8895AFA, AH3HID         hash table index, accession, hospital id
    95, AH4ACC*1, AH4HID

--- ACC to BID Container ---           relates accession to bottle IDs that share that accession
    83, AH3ACC*8895AFA, AH3BID1        hash table index, accession, bottle id
    95, AH4ACC*1, AH4BID1

--- BarCodeDictionary ---              relates bottle ID to a bottle record, key values from that
                                       record are displayed

 [a:1003600 n:28 s:28 p:60] [r:2 s:P x:1] [loc:
  1A20 ld: 1]
  bid: AH3BID1 acc: AH3ACC*8895AFA
  hid: AH3HID pn: ,

 [a:1003800 n:29 s:29 p:61] [r:3 s:I x:1] [loc:
  1A40 ld: 1]
  bid: AH4BID1 acc: AH4ACC*1
  hid: AH4HID pn: AH4LAST, AH4FIRST
```

a: address of bottle record
n: bottle record index (1-1920) s: bottle record sequence num
p: hash table index
r: result code (1=pos 2=neg 3=ntd 4=near pos)
s: status (P=prelim, I= incomplete, F=final) x: significant test result if non-zero
ld: 0=unloaded 1=loaded
loc: if "ld: 1", cell where bottle is loaded; if "ld: 0", cell where bottle was last loaded
bid: bottle id
acc: accession number
hid: hospital id
pn: last, first parts of patient name

```
--- ACC to ACC Container ---            relates a base accession to accessions with same base
     3, AH3ACC, AH3ACC*8895AFA         hash table index, base accession, accession with suffix
     4, AH4ACC, AH4ACC*1

--- PRELOAD: ACC to RecNums Container ---   relates a base accession to all record numbers in the
                                            preload file that have that accession
     2, ACC*1, 11                      hash table index, accession, preload file rec num
    14, ACC43, 6

--- PRELOAD: BID to RecNum Dictionary ---   relates a bottle ID to the one record number
                                            in the preload file that has that bottle ID

          171, AH2BIDA, 12             hash table index,bottle ID, preload file rec num
```

--- PRELOAD: ACC to RecNum Dictionary --- *release an accession to the one record number in the preload file that has that accession*

191, AH4ACC*1, 2 *hash table index, accession, preload file rec num*
275, AH3ACC*8895AFA, 1

[6] Bottle processing tables

Displayed the current content of the tables that drive the way the 3D processes bottles. An example is shown below.

```
*** Bottle Processing Tables Log ***
------------ Bottle IDs Table (76 entries) ----------
  Prefix, Min, Max, BottleType, Container Type
  ZINHI, 5, 15, 23, 2
  ZBLYM, 5, 8, 16, 2
  ZPPC, 5, 15, 29, 2
  ZPDC, 5, 15, 28, 2
  ZEMB, 5, 15, 25, 2
  ZSTR, 5, 15, 24, 2
  ZINH, 5, 15, 22, 2
  ZRIF, 5, 15, 21, 2
  ZPZA, 5, 15, 20, 2
  ZBMB, 5, 8, 18, 2
  ZBMP, 5, 8, 17, 2
  ZBPF, 5, 8, 15, 2
  ZBFN, 5, 8, 14, 2
  ZBFA, 5, 8, 13, 2
  ZBSN, 5, 15, 12, 2
  ZBSA, 5, 8, 11, 2
  ZPC, 5, 15, 27, 2
  ZDC, 5, 15, 26, 2
  ZGD, 5, 15, 19, 2
  ZMB, 5, 15, 9, 1
  Prefix, Min, Max, BottleType, Container Type
  ZMS, 5, 15, 8, 1
  ZPN, 5, 15, 7, 1
  ZPA, 5, 15, 6, 1
  ZFN, 5, 15, 5, 1
  ZFA, 5, 15, 4, 1
  @O, 8, 8, 29, 2
  @A, 8, 8, 28, 2
  @C, 8, 8, 27, 2
  @D, 8, 8, 26, 2
  @E, 8, 8, 25, 2
  @S, 8, 8, 24, 2
  @I, 8, 8, 22, 2
  @Z, 8, 8, 23, 2
  @R, 8, 8, 21, 2
  @P, 8, 8, 20, 2
  !B, 8, 8, 18, 2
  !M, 8, 8, 17, 2
  !L, 8, 8, 16, 2
  !P, 8, 8, 15, 2
  !G, 8, 8, 14, 2
  Prefix, Min, Max, BottleType, Container Type
  !F, 8, 8, 13, 2
  !N, 8, 8, 12, 2
  !A, 8, 8, 11, 2
  SB, 8, 8, 18, 3
  SM, 8, 8, 17, 3
  SL, 8, 8, 16, 3
  SP, 8, 8, 15, 3
  SG, 8, 8, 14, 3
  SF, 8, 8, 13, 3
  SN, 8, 8, 12, 3
  SA, 8, 8, 11, 3
  MB, 0, 0, 8, 1
  MS, 10, 10, 8, 1
  PN, 10, 10, 7, 1
  PE, 10, 10, 6, 1
  FN, 10, 10, 5, 1
  FA, 10, 10, 4, 1
  ZN, 5, 15, 3, 1
```

```
ZA, 5, 8, 2, 1
IA, 8, 8, 50, 2
Prefix, Min, Max, BottleType, Container Type
IN, 8, 8, 51, 2
IL, 8, 8, 52, 2
9, 0, 0, 0, 0
8, 0, 0, 0, 0
7, 0, 0, 0, 0
6, 0, 0, 0, 0
5, 0, 0, 0, 0
4, 0, 0, 0, 0
3, 0, 0, 0, 0
2, 0, 0, 0, 0
1, 0, 0, 0, 0
0, 0, 0, 0, 0
G, 0, 0, 0, 0
U, 0, 0, 1, 0
H, 9, 9, 3, 1
D, 9, 9, 2, 1

---------- Bottle Types Table (100 entries) ----------
Type, Name, UTT, Disp, Drw, Cnt, Disk, LES/Glass, LES/Plas.
0, GENERIC, G, 1, 3, 0, 10, 5, 11
1, UNKNOWN, U, 1, 5, 0, 10, 5, 11
2, AEROBIC, A, 1, 2, 1, 10, 10, 10
3, ANAEROBIC, N, 1, 2, 1, 10, 10, 10
4, FAN AEROBIC, FA, 1, 2, 1, 10, 10, 10
5, FAN ANAEROBIC, FN, 1, 2, 1, 10, 10, 10
6, PEDI-BACT, PE, 1, 2, 1, 10, 10, 10
7, LYM-BACT, PN, 1, 2, 1, 4, 4, 4
8, MB/BACT, MS, 1, 1, 1, 2, 2, 2
9, MB/BACT BLOOD, MB, 1, 4, 1, 3, 3, 3
10, BACT/ALERT SV, BA, 0, 2, 0, 5, 5, 11
11, BACT/ALERT SA, BA, 0, 2, 0, 5, 5, 11
12, BACT/ALERT SN, BN, 0, 2, 0, 5, 5, 11
13, BACT/ALERT FA, BFA, 0, 2, 0, 6, 6, 12
14, BACT/ALERT FN, BFN, 0, 2, 0, 5, 5, 11
15, BACT/ALERT PF, BPE, 0, 2, 0, 5, 5, 11
16, BACT/ALERT LYM, BLYM, 0, 2, 0, 9, 9, 15
17, BACT/ALERT MP, BMS, 0, 1, 0, 7, 16, 13
18, BACT/ALERT MB, BMB, 0, 4, 0, 8, 17, 14
19, GENERIC DRUG, GD, 0, 1, 4, 3, 17, 17
Type, Name, UTT, Disp, Drw, Cnt, Disk, LES/Glass, LES/Plas.
20, PYRAZINAMIDE, PZA, 0, 1, 4, 2, 16, 16
21, RIFAMPIN, RIF, 0, 1, 4, 3, 17, 17
22, ISONIAZID, INH, 0, 1, 4, 3, 17, 17
23, ISONIAZID HI, INHI, 0, 1, 4, 3, 17, 17
24, STREPTOMYCIN, STR, 0, 1, 4, 3, 17, 17
25, ETHAMBUTOL, EMB, 0, 1, 4, 3, 17, 17
26, DIRECT CONTROL, DC, 0, 1, 4, 3, 17, 17
27, PROP CONTROL, PC, 0, 1, 4, 3, 17, 17
28, PZA DIRECT CONTROL, PDC, 0, 1, 4, 2, 16, 16
29, PZA PROP CONTROL, PPC, 0, 1, 4, 2, 16, 16
30, Q30, Q30, 0, 3, 0, 10, 5, 11
31, Q31, Q31, 0, 3, 0, 10, 5, 11
32, Q32, Q32, 0, 3, 0, 10, 5, 11
33, Q33, Q33, 0, 3, 0, 10, 5, 11
34, Q34, Q34, 0, 3, 0, 10, 5, 11
35, Q35, Q35, 0, 3, 0, 10, 5, 11
36, Q36, Q36, 0, 3, 0, 10, 5, 11
37, Q37, Q37, 0, 3, 0, 10, 5, 11
38, Q38, Q38, 0, 3, 0, 10, 5, 11
39, Q39, Q39, 0, 3, 0, 10, 5, 11
Type, Name, UTT, Disp, Drw, Cnt, Disk, LES/Glass, LES/Plas.
40, Q40, Q40, 0, 3, 0, 10, 5, 11
41, Q41, Q41, 0, 3, 0, 10, 5, 11
42, Q42, Q42, 0, 3, 0, 10, 5, 11
43, Q43, Q43, 0, 3, 0, 10, 5, 11
44, Q44, Q44, 0, 3, 0, 10, 5, 11
45, Q45, Q45, 0, 3, 0, 10, 5, 11
46, Q46, Q46, 0, 3, 0, 10, 5, 11
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   47, Q47, Q47, 0, 3, 0, 10, 5, 11
   48, Q48, Q48, 0, 3, 0, 10, 5, 11
   49, Q49, Q49, 0, 3, 0, 10, 5, 11
   50, BTA-I AST, ISA, 0, 2, 0, 5, 5, 11
   51, BTA-I NST, ISN, 0, 2, 0, 5, 5, 11
   52, BTA-I LYM, ILYM, 0, 2, 0, 9, 9, 15
   53, Q53, Q53, 0, 3, 0, 10, 5, 11
   54, Q54, Q54, 0, 3, 0, 10, 5, 11
   55, Q55, Q55, 0, 3, 0, 10, 5, 11
   56, Q56, Q56, 0, 3, 0, 10, 5, 11
   57, Q57, Q57, 0, 3, 0, 10, 5, 11
   58, Q58, Q58, 0, 3, 0, 10, 5, 11
   59, Q59, Q59, 0, 3, 0, 10, 5, 11
   Type, Name, UTT, Disp, Drw, Cnt, Disk, LES/Glass, LES/Plas.
   60, Q60, Q60, 0, 3, 0, 10, 5, 11
   61, Q61, Q61, 0, 3, 0, 10, 5, 11
   62, Q62, Q62, 0, 3, 0, 10, 5, 11
   63, Q63, Q63, 0, 3, 0, 10, 5, 11
   64, Q64, Q64, 0, 3, 0, 10, 5, 11
   65, Q65, Q65, 0, 3, 0, 10, 5, 11
   66, Q66, Q66, 0, 3, 0, 10, 5, 11
   67, Q67, Q67, 0, 3, 0, 10, 5, 11
   68, Q68, Q68, 0, 3, 0, 10, 5, 11
   69, Q69, Q69, 0, 3, 0, 10, 5, 11
   70, Q70, Q70, 0, 3, 0, 10, 5, 11
   71, Q71, Q71, 0, 3, 0, 10, 5, 11
   72, Q72, Q72, 0, 3, 0, 10, 5, 11
   73, Q73, Q73, 0, 3, 0, 10, 5, 11
   74, Q74, Q74, 0, 3, 0, 10, 5, 11
   75, Q75, Q75, 0, 3, 0, 10, 5, 11
   76, Q76, Q76, 0, 3, 0, 10, 5, 11
   77, Q77, Q77, 0, 3, 0, 10, 5, 11
   78, Q78, Q78, 0, 3, 0, 10, 5, 11
   79, Q79, Q79, 0, 3, 0, 10, 5, 11
   Type, Name, UTT, Disp, Drw, Cnt, Disk, LES/Glass, LES/Plas.
   80, Q80, Q80, 0, 3, 0, 10, 5, 11
   81, Q81, Q81, 0, 3, 0, 10, 5, 11
   82, Q82, Q82, 0, 3, 0, 10, 5, 11
   83, Q83, Q83, 0, 3, 0, 10, 5, 11
   84, Q84, Q84, 0, 3, 0, 10, 5, 11
   85, Q85, Q85, 0, 3, 0, 10, 5, 11
   86, Q86, Q86, 0, 3, 0, 10, 5, 11
   87, Q87, Q87, 0, 3, 0, 10, 5, 11
   88, Q88, Q88, 0, 3, 0, 10, 5, 11
   89, Q89, Q89, 0, 3, 0, 10, 5, 11
   90, Q90, Q90, 0, 3, 0, 10, 5, 11
   91, Q91, Q91, 0, 3, 0, 10, 5, 11
   92, Q92, Q92, 0, 3, 0, 10, 5, 11
   93, Q93, Q93, 0, 3, 0, 10, 5, 11
   94, Q94, Q94, 0, 3, 0, 10, 5, 11
   95, Q95, Q95, 0, 3, 0, 10, 5, 11
   96, Q96, Q96, 0, 3, 0, 10, 5, 11
   97, Q97, Q97, 0, 3, 0, 10, 5, 11
   98, Q98, Q98, 0, 3, 0, 10, 5, 11
   99, Q99, Q99, 0, 3, 0, 10, 5, 11

-------  Algorithm Parameter Tables (100 entries) ----------
    0 ID(H2) BltFact(0.1E1) Resv(1320) AdjThres(70) AdjLim(4)
      StupPts(5) StupSumx(15) StupDenom(50)
      FastPts(17) FastSumx(153) FastDenom(6936)
      InitThres(3300) FastStupThres(6) SlopStupThres(0.1E1)
      FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
      FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
      FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
      SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
      SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
      MinSkipPts(6)
    1 ID(E2) BltFact(0.1E1) Resv(1320) AdjThres(70) AdjLim(4)
      StupPts(5) StupSumx(15) StupDenom(50)
      FastPts(17) FastSumx(153) FastDenom(6936)
      InitThres(3300) FastStupThres(6) SlopStupThres(0.1E1)
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   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
 2 ID(G2) BltFact(0.1E1) Resv(1320)
   MinSkipPts(216) MinAvgPts(24) MinAvgMed(1)
   SlopProp(0.1E0) SlowSlopProp(0.2E-1)
   FastDgdr(0.75E0) SlowDgdr(0.9E0)
   AcelSlopThres(20) SlowSlopThres(10)
   PosDlyThres(1) DltThres(100) NumAlg2Pts(576)
   PosSlopDly(720) DltDgdr(0.995E0)
   --- Embedded E2 Parms ---
   ID(E2) BltFact(0.1E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(3300) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
 3 ID(G2) BltFact(0.1E1) Resv(1320)
   MinSkipPts(216) MinAvgPts(24) MinAvgMed(1)
   SlopProp(0.1E0) SlowSlopProp(0.2E-1)
   FastDgdr(0.75E0) SlowDgdr(0.9E0)
   AcelSlopThres(20) SlowSlopThres(10)
   PosDlyThres(1) DltThres(32767) NumAlg2Pts(576)
   PosSlopDly(720) DltDgdr(<1.0E-32)
   --- Embedded E2 Parms ---
   ID(E2) BltFact(0.1E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(3300) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
 4 ID(H2) BltFact(0.1E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(3300) FastStupThres(6) SlopStupThres(-0.1E5)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(1) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(0)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
 5 ID(H2) BltFact(0.1667E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(6000) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
 6 ID(H2) BltFact(0.1667E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(6500) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
 7 ID(G2) BltFact(0.1667E1) Resv(1320)
   MinSkipPts(216) MinAvgPts(24) MinAvgMed(1)
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   SlopProp(0.1E0) SlowSlopProp(0.2E-1)
   FastDgdr(0.75E0) SlowDgdr(0.9E0)
   AcelSlopThres(20) SlowSlopThres(10)
   PosDlyThres(1) DltThres(100) NumAlg2Pts(576)
   PosSlopDly(720) DltDgdr(0.995E0)
   --- Embedded E2 Parms ---
   ID(E2) BltFact(0.1667E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(6000) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
 8 ID(G2) BltFact(0.1667E1) Resv(1320)
   MinSkipPts(216) MinAvgPts(24) MinAvgMed(1)
   SlopProp(0.1E0) SlowSlopProp(0.2E-1)
   FastDgdr(0.75E0) SlowDgdr(0.9E0)
   AcelSlopThres(20) SlowSlopThres(10)
   PosDlyThres(1) DltThres(32767) NumAlg2Pts(576)
   PosSlopDly(720) DltDgdr(<1.0E-32)
   --- Embedded E2 Parms ---
   ID(E2) BltFact(0.1667E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(6000) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
 9 ID(H2) BltFact(0.1667E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(6000) FastStupThres(6) SlopStupThres(-0.1E5)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(1) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(0)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
10 ID(H2) BltFact(0.1E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(3300) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
11 ID(H2) BltFact(0.231E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(8300) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
12 ID(H2) BltFact(0.231E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(8800) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
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   MinSkipPts(6)
13 ID(G3) BltFact(0.231E1) Resv(1320)
   MinSkipPts(216) MinAvgPts(24) MinAvgMed(1)
   SlopProp(0.1E0) SlowSlopProp(0.2E-1)
   FastDgdr(0.75E0) SlowDgdr(0.9E0)
   AcelSlopThres(20) SlowSlopThres(10)
   PosDlyThres(1) DltThres(100) NumAlg3Pts(576)
   PosSlopDly(720) DltDgdr(0.995E0)
   --- Embedded H2 Parms ---
   ID(H2) BltFact(0.231E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(8300) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
14 ID(G3) BltFact(0.231E1) Resv(1320)
   MinSkipPts(216) MinAvgPts(24) MinAvgMed(1)
   SlopProp(0.1E0) SlowSlopProp(0.2E-1)
   FastDgdr(0.75E0) SlowDgdr(0.9E0)
   AcelSlopThres(20) SlowSlopThres(10)
   PosDlyThres(1) DltThres(32767) NumAlg3Pts(576)
   PosSlopDly(720) DltDgdr(<1.0E-32)
   --- Embedded H2 Parms ---
   ID(H2) BltFact(0.231E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(8300) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
15 ID(H2) BltFact(0.231E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(8300) FastStupThres(6) SlopStupThres(-0.1E5)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(1) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(0)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
16 ID(G3) BltFact(0.1667E1) Resv(1320)
   MinSkipPts(216) MinAvgPts(24) MinAvgMed(1)
   SlopProp(0.1E0) SlowSlopProp(0.2E-1)
   FastDgdr(0.75E0) SlowDgdr(0.9E0)
   AcelSlopThres(20) SlowSlopThres(10)
   PosDlyThres(1) DltThres(100) NumAlg3Pts(576)
   PosSlopDly(720) DltDgdr(0.995E0)
   --- Embedded H2 Parms ---
   ID(H2) BltFact(0.1667E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(6000) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
17 ID(G3) BltFact(0.1667E1) Resv(1320)
   MinSkipPts(216) MinAvgPts(24) MinAvgMed(1)
   SlopProp(0.1E0) SlowSlopProp(0.2E-1)
   FastDgdr(0.75E0) SlowDgdr(0.9E0)
   AcelSlopThres(20) SlowSlopThres(10)
   PosDlyThres(1) DltThres(32767) NumAlg3Pts(576)
```

```
   PosSlopDly(720) DltDgdr(<1.0E-32)
   --- Embedded H2 Parms ---
   ID(H2) BltFact(0.1667E1) Resv(1320) AdjThres(70) AdjLim(4)
   StupPts(5) StupSumx(15) StupDenom(50)
   FastPts(17) FastSumx(153) FastDenom(6936)
   InitThres(6000) FastStupThres(6) SlopStupThres(0.1E1)
   FastCntrThres(12) FastBcktThres(0.105E2) FastBcktInc(1)
   FastRateThres(32) FastRateInc(3) FastDgdr(0.93E0)
   FastSlopProp(0.825E0) FastMayThres(3) SlowStupThres(12)
   SlowCntrThres(16) SlowBcktThres(15) SlowBcktInc(1)
   SlowDgdr(0.98E0) SlowSlopProp(0.9083E0)
   MinSkipPts(6)
18 not used
19 not used
20 not used
21 not used
22 not used
23 not used
24 not used
25 not used
26 not used
27 not used
28 not used
29 not used
30 not used
31 not used
32 not used
33 not used
34 not used
35 not used
36 not used
37 not used
38 not used
39 not used
40 not used
41 not used
42 not used
43 not used
44 not used
45 not used
46 not used
47 not used
48 not used
49 not used
50 not used
51 not used
52 not used
53 not used
54 not used
55 not used
56 not used
57 not used
58 not used
59 not used
60 not used
61 not used
62 not used
63 not used
64 not used
65 not used
66 not used
67 not used
68 not used
69 not used
70 not used
71 not used
72 not used
73 not used
74 not used
75 not used
76 not used
```

```
   77 not used
   78 not used
   79 not used
   80 not used
   81 not used
   82 not used
   83 not used
   84 not used
   85 not used
   86 not used
   87 not used
   88 not used
   89 not used
   90 not used
   91 not used
   92 not used
   93 not used
   94 not used
   95 not used
   96 not used
   97 not used
   98 not used
   99 not used

------------ Default Maximum Test Times ----------
  7.0 days (  604800 secs.)  Type = GENERIC (0)
  7.0 days (  604800 secs.)  Type = UNKNOWN (1)
  7.0 days (  604800 secs.)  Type = AEROBIC (2)
  7.0 days (  604800 secs.)  Type = ANAEROBIC (3)
  7.0 days (  604800 secs.)  Type = FAN AEROBIC (4)
  7.0 days (  604800 secs.)  Type = FAN ANAEROBIC (5)
  7.0 days (  604800 secs.)  Type = PEDI-BACT (6)
  7.0 days (  604800 secs.)  Type = LYM-BACT (7)
 42.0 days ( 3628800 secs.)  Type = MB/BACT (8)
 42.0 days ( 3628800 secs.)  Type = MB/BACT BLOOD (9)
  7.0 days (  604800 secs.)  Type = BACT/ALERT SV (10)
  7.0 days (  604800 secs.)  Type = BACT/ALERT SA (11)
  7.0 days (  604800 secs.)  Type = BACT/ALERT SN (12)
  7.0 days (  604800 secs.)  Type = BACT/ALERT FA (13)
  7.0 days (  604800 secs.)  Type = BACT/ALERT FN (14)
  7.0 days (  604800 secs.)  Type = BACT/ALERT PF (15)
  7.0 days (  604800 secs.)  Type = BACT/ALERT LYM (16)
 42.0 days ( 3628800 secs.)  Type = BACT/ALERT MP (17)
 42.0 days ( 3628800 secs.)  Type = BACT/ALERT MB (18)
 15.0 days ( 1296000 secs.)  Type = GENERIC DRUG (19)
 30.0 days ( 2592000 secs.)  Type = PYRAZINAMIDE (20)
 15.0 days ( 1296000 secs.)  Type = RIFAMPIN (21)
 15.0 days ( 1296000 secs.)  Type = ISONIAZID (22)
 15.0 days ( 1296000 secs.)  Type = ISONIAZID HI (23)
 15.0 days ( 1296000 secs.)  Type = STREPTOMYCIN (24)
 15.0 days ( 1296000 secs.)  Type = ETHAMBUTOL (25)
 15.0 days ( 1296000 secs.)  Type = DIRECT CONTROL (26)
 15.0 days ( 1296000 secs.)  Type = PROP CONTROL (27)
 30.0 days ( 2592000 secs.)  Type = PZA DIRECT CONTROL (28)
 30.0 days ( 2592000 secs.)  Type = PZA PROP CONTROL (29)
  7.0 days (  604800 secs.)  Type = Q30 (30)
  7.0 days (  604800 secs.)  Type = Q31 (31)
  7.0 days (  604800 secs.)  Type = Q32 (32)
  7.0 days (  604800 secs.)  Type = Q33 (33)
  7.0 days (  604800 secs.)  Type = Q34 (34)
  7.0 days (  604800 secs.)  Type = Q35 (35)
  7.0 days (  604800 secs.)  Type = Q36 (36)
  7.0 days (  604800 secs.)  Type = Q37 (37)
  7.0 days (  604800 secs.)  Type = Q38 (38)
  7.0 days (  604800 secs.)  Type = Q39 (39)
  7.0 days (  604800 secs.)  Type = Q40 (40)
  7.0 days (  604800 secs.)  Type = Q41 (41)
  7.0 days (  604800 secs.)  Type = Q42 (42)
  7.0 days (  604800 secs.)  Type = Q43 (43)
  7.0 days (  604800 secs.)  Type = Q44 (44)
  7.0 days (  604800 secs.)  Type = Q45 (45)
```

```
  7.0 days (  604800 secs.)  Type = Q46 (46)
  7.0 days (  604800 secs.)  Type = Q47 (47)
  7.0 days (  604800 secs.)  Type = Q48 (48)
  7.0 days (  604800 secs.)  Type = Q49 (49)
  7.0 days (  604800 secs.)  Type = BTA-I AST (50)
  7.0 days (  604800 secs.)  Type = BTA-I NST (51)
  7.0 days (  604800 secs.)  Type = BTA-I LYM (52)
  7.0 days (  604800 secs.)  Type = Q53 (53)
  7.0 days (  604800 secs.)  Type = Q54 (54)
  7.0 days (  604800 secs.)  Type = Q55 (55)
  7.0 days (  604800 secs.)  Type = Q56 (56)
  7.0 days (  604800 secs.)  Type = Q57 (57)
  7.0 days (  604800 secs.)  Type = Q58 (58)
  7.0 days (  604800 secs.)  Type = Q59 (59)
  7.0 days (  604800 secs.)  Type = Q60 (60)
  7.0 days (  604800 secs.)  Type = Q61 (61)
  7.0 days (  604800 secs.)  Type = Q62 (62)
  7.0 days (  604800 secs.)  Type = Q63 (63)
  7.0 days (  604800 secs.)  Type = Q64 (64)
  7.0 days (  604800 secs.)  Type = Q65 (65)
  7.0 days (  604800 secs.)  Type = Q66 (66)
  7.0 days (  604800 secs.)  Type = Q67 (67)
  7.0 days (  604800 secs.)  Type = Q68 (68)
  7.0 days (  604800 secs.)  Type = Q69 (69)
  7.0 days (  604800 secs.)  Type = Q70 (70)
  7.0 days (  604800 secs.)  Type = Q71 (71)
  7.0 days (  604800 secs.)  Type = Q72 (72)
  7.0 days (  604800 secs.)  Type = Q73 (73)
  7.0 days (  604800 secs.)  Type = Q74 (74)
  7.0 days (  604800 secs.)  Type = Q75 (75)
  7.0 days (  604800 secs.)  Type = Q76 (76)
  7.0 days (  604800 secs.)  Type = Q77 (77)
  7.0 days (  604800 secs.)  Type = Q78 (78)
  7.0 days (  604800 secs.)  Type = Q79 (79)
  7.0 days (  604800 secs.)  Type = Q80 (80)
  7.0 days (  604800 secs.)  Type = Q81 (81)
  7.0 days (  604800 secs.)  Type = Q82 (82)
  7.0 days (  604800 secs.)  Type = Q83 (83)
  7.0 days (  604800 secs.)  Type = Q84 (84)
  7.0 days (  604800 secs.)  Type = Q85 (85)
  7.0 days (  604800 secs.)  Type = Q86 (86)
  7.0 days (  604800 secs.)  Type = Q87 (87)
  7.0 days (  604800 secs.)  Type = Q88 (88)
  7.0 days (  604800 secs.)  Type = Q89 (89)
  7.0 days (  604800 secs.)  Type = Q90 (90)
  7.0 days (  604800 secs.)  Type = Q91 (91)
  7.0 days (  604800 secs.)  Type = Q92 (92)
  7.0 days (  604800 secs.)  Type = Q93 (93)
  7.0 days (  604800 secs.)  Type = Q94 (94)
  7.0 days (  604800 secs.)  Type = Q95 (95)
  7.0 days (  604800 secs.)  Type = Q96 (96)
  7.0 days (  604800 secs.)  Type = Q97 (97)
  7.0 days (  604800 secs.)  Type = Q98 (98)
  7.0 days (  604800 secs.)  Type = Q99 (99)


------------ Bottle Types Tracking Data ----------
  0 LES/Glass    (0x6000)  Display GENERIC
  1 LES/Glass    (0x6000)  Display UNKNOWN
  2 LES/Glass    (0x2000)  Display AEROBIC
  3 LES/Glass    (0x2000)  Display ANAEROBIC
  4 LES/Glass    (0x2000)  Display FAN AEROBIC
  5 LES/Glass    (0x2000)  Display FAN ANAEROBIC
  6 LES/Glass    (0x2000)  Display PEDI-BACT
  7 LES/Glass    (0x2000)  Display LYM-BACT
  8 LES/Glass    (0x4000)  Display MB/BACT
  9 LES/Glass    (0x6000)  Display MB/BACT BLOOD
 10 LES/Glass    (0x2000)
 11 LES/Glass    (0x2000)  Display BACT/ALERT SA
 12 LES/Glass    (0x2000)  Display BACT/ALERT SN
 13 LES/Glass    (0x2000)  Display BACT/ALERT FA
```

```
14 LES/Glass    (0x2000)  Display BACT/ALERT FN
15 LES/Plastic  (0x2001)  Display BACT/ALERT PF
16 LES/Glass    (0x2000)  Display BACT/ALERT LYM
17 LES/Glass    (0x4000)  Display BACT/ALERT MP
18 LES/Glass    (0x6000)  Display BACT/ALERT MB
19 LES/Glass    (0x4000)
20 LES/Glass    (0x4000)
21 LES/Glass    (0x4000)
22 LES/Glass    (0x4000)
23 LES/Glass    (0x4000)
24 LES/Glass    (0x4000)
25 LES/Glass    (0x4000)
26 LES/Glass    (0x4000)
27 LES/Glass    (0x4000)
28 LES/Glass    (0x4000)
29 LES/Glass    (0x4000)
30 LES/Glass    (0x6000)
31 LES/Glass    (0x6000)
32 LES/Glass    (0x6000)
33 LES/Glass    (0x6000)
34 LES/Glass    (0x6000)
35 LES/Glass    (0x6000)
36 LES/Glass    (0x6000)
37 LES/Glass    (0x6000)
38 LES/Glass    (0x6000)
39 LES/Glass    (0x6000)
40 LES/Glass    (0x6000)
41 LES/Glass    (0x6000)
42 LES/Glass    (0x6000)
43 LES/Glass    (0x6000)
44 LES/Glass    (0x6000)
45 LES/Glass    (0x6000)
46 LES/Glass    (0x6000)
47 LES/Glass    (0x6000)
48 LES/Glass    (0x6000)
49 LES/Glass    (0x6000)
50 LES/Glass    (0x2000)
51 LES/Glass    (0x2000)
52 LES/Glass    (0x2000)
53 LES/Glass    (0x6000)
54 LES/Glass    (0x6000)
55 LES/Glass    (0x6000)
56 LES/Glass    (0x6000)
57 LES/Glass    (0x6000)
58 LES/Glass    (0x6000)
59 LES/Glass    (0x6000)
60 LES/Glass    (0x6000)
61 LES/Glass    (0x6000)
62 LES/Glass    (0x6000)
63 LES/Glass    (0x6000)
64 LES/Glass    (0x6000)
65 LES/Glass    (0x6000)
66 LES/Glass    (0x6000)
67 LES/Glass    (0x6000)
68 LES/Glass    (0x6000)
69 LES/Glass    (0x6000)
70 LES/Glass    (0x6000)
71 LES/Glass    (0x6000)
72 LES/Glass    (0x6000)
73 LES/Glass    (0x6000)
74 LES/Glass    (0x6000)
75 LES/Glass    (0x6000)
76 LES/Glass    (0x6000)
77 LES/Glass    (0x6000)
78 LES/Glass    (0x6000)
79 LES/Glass    (0x6000)
80 LES/Glass    (0x6000)
81 LES/Glass    (0x6000)
82 LES/Glass    (0x6000)
83 LES/Glass    (0x6000)
84 LES/Glass    (0x6000)
```

```
85 LES/Glass    (0x6000)
86 LES/Glass    (0x6000)
87 LES/Glass    (0x6000)
88 LES/Glass    (0x6000)
89 LES/Glass    (0x6000)
90 LES/Glass    (0x6000)
91 LES/Glass    (0x6000)
92 LES/Glass    (0x6000)
93 LES/Glass    (0x6000)
94 LES/Glass    (0x6000)
95 LES/Glass    (0x6000)
96 LES/Glass    (0x6000)
97 LES/Glass    (0x6000)
98 LES/Glass    (0x6000)
99 LES/Glass    (0x6000)
```

[7] Configuration tables

Displays the configuration settings that are used to determine the 3D's operation. All configuration settings are shown, regardless of whether the value was read from one of the **.INI** files or whether the value is a default value. An example is shown below.

```
*** Configuration Data Log ***
[DEBUG]
 LockNeverUsedList=0
 SpecialKeys=1
 ShowBottleProcState=0
 ExtCellStatusScreen=1
[MODEM]
 Init8=
 Init7=
 Init6=
 Init5=
 Init4=
 Init3=
 Init2=
 Init1=
 RIToDCDTimeout=30
 BaudRate=3
[PATIENTNAME]
 Available=1
 FNameRequired=0
 LNameRequired=0
 ForceUppercase=1
[HOSPITALID]
 Available=1
 Required=0
 ForceUppercase=0
[ACCESSIONNUM]
 Available=1
 Required=0
 ForceUppercase=0
 Lifetime=0
 FirstCharOther=1
 FirstCharNumeric=1
 FirstCharAlpha=1
 MaxLength=0
 MinLength=0
[BOTTLEID]
 Required=0
 AlertIfGeneric=1
 FirstCharOther=1
 FirstCharNumeric=1
 FirstCharAlpha=1
[USERINTF]
 PositiveReminderPeriod=60
 DrawerOpenFaultPeriod=120
 FaultReminderPeriod=300
[PRINTER]
 PaperSize=0
 Type=0
[InstrCntrl]
 RackTempStableThres=10
 RackTempDeltaThres=300
 RackTempWrongWayThres=2
 InhibitCommHoldoffTime=620
 DeskBlue=0
 DeskGreen=0
 DeskRed=0
 Type=0
[LIS]
 PeriodicallyTestLink=0
 TestOrderPollPeriod=0
```

```
 FlagResultOnUnload=0
 FlagResultOnPositive=1
 FlagResultOnNegative=1
 FlagResultOnLoad=0
 AutoTransmitResults=0
 Bidirectional=1
 BitsPerChar=8
 StopBits=1
 Parity=0
 BaudRate=48
 Enabled=0
[DBMS]
 Enabled=1
```

[8] Scandisk Output

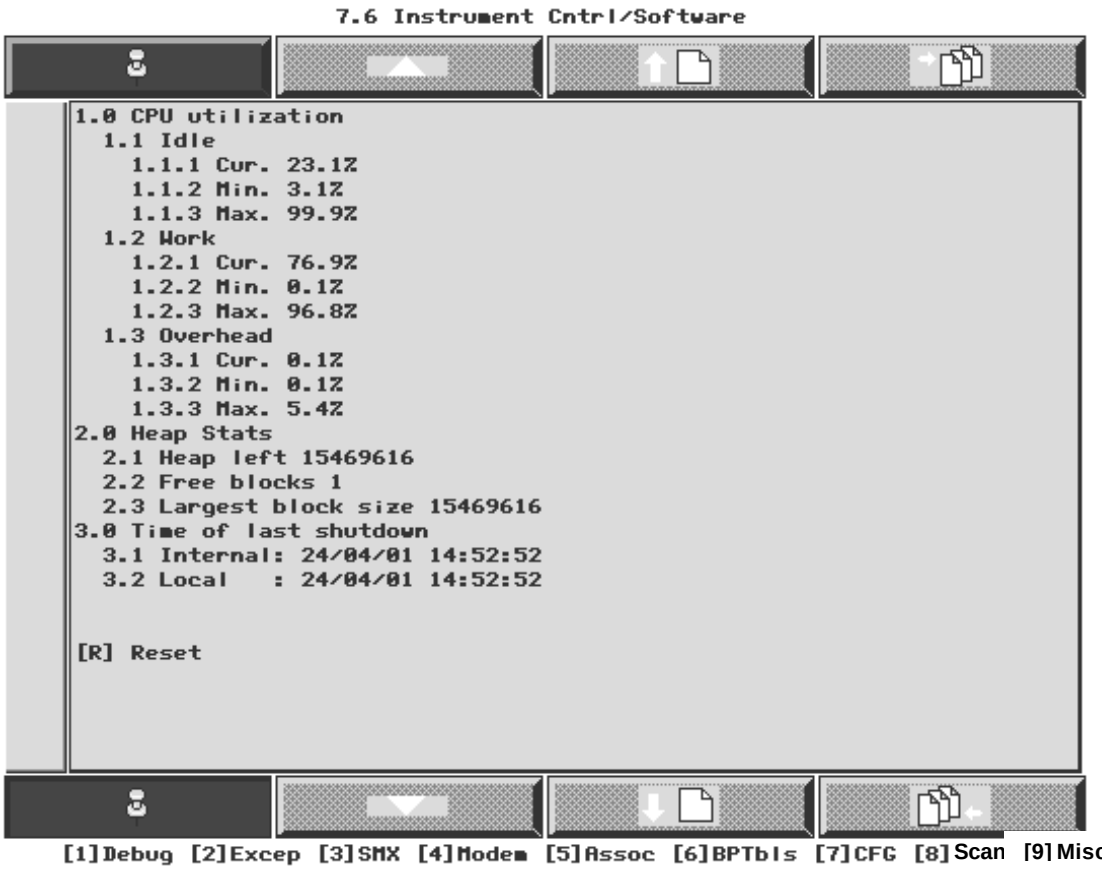

Fig. 89 - 7.6 Instrument Cntrl/Software Test Screen - Scan

Scandisk, as its name implies, is a function that runs periodically to check the integrity of the **C** and **D** drives. For the **C**: drive, an addition set of checks is made to verify the size of the fixed size files associated with the 3D application. This is not done for the **D**: drive.

The output of this operation is displayed on the screen. Below is an example of that output.

```
*** ScanDisk Log ***

*****************************************************
DRIVE INFO for C:
  OEMName      = MSDOS5.0
  Bytes/Sec    = 512
  Secs/Cluster = 4
  Rsvd Secs    = 1
  Num of FATS  = 2
  Root Ent Cnt = 512
  TotSec16     = 0
  Media        = 0xF8
  FATSz16      = 245
  Secs/Trk     = 32
  Num of Heads = 8
  Hidden Secs  = 32
  TotSec32     = 250336
  DrvTypeNum   = 128
  Reserved1    = 0x0
  BootSig      = 0x29
```

```
  VolID        = 981014277
  Vol Label    = NO NAME
  FileSysType  = FAT16
  --- Computed data ---
  FAT Type     = 16
  FAT Size     = 245
  Total Secs   = 250336
  Bytes/FATEnt = 2
  RootDirSector= 491
  RootDirSectrs= 32
  DataSector   = 523
  ClusterSector= 523
  EOCMark     >= 0xFFF8
  BADSectorMark= 0xFFF7
  Cluster 2 sector = 523
**********************************************************

**********************************************************
SCANDISK C:
  Time = 10/12/01 09:14:28
----------------------------
 CHECK DIRECTORY STRUCTURES
----------------------------
    File IO.SYS
    File MSDOS.SYS
    Directory DOS
    File COMMAND.COM
    File AUTOEXEC.BAT
    File CONFIG.SYS
    File PME16.EXE
    File BTA3D.INI
    Total Entries   7
    Deleted Entries 0
    Directories     1
    Cluster count   1

 Traverse subdirectory DOS
    Directory .
    Directory ..
    File ATTRIB.EXE
    File CHKDSK.EXE
    File COUNTRY.SYS
    Total Entries   5
    Deleted Entries 0
    Directories     2
    Cluster count   1

----------------------------
 CHECK FILE STRUCTURES
----------------------------
    Check file IO.SYS
    Check file MSDOS.SYS
    Check file COMMAND.COM
    Check file AUTOEXEC.BAT
    Check file CONFIG.SYS
    Check file PME16.EXE
Traverse subdirectory DOS
    Check file ATTRIB.EXE
    Check file CHKDSK.EXE
    Check file COUNTRY.SYS

----------------------------
 CHECK FREE SPACE
----------------------------
  Check free space for clusters 2 to 62454
**********************************************************
SCANDISK PASSED for drive C:
  Time = 10/12/01 09:14:29
**********************************************************

**********************************************************
```

```
CHECK FIXED SIZED FILES
*****************************************************
  C:\CPUNVRAM.BIN expected / actual size 524288 / 524288
  C:\CPUNVR2.BIN expected / actual size 524288 / 524288
  C:\SSDNVRAM.BIN expected / actual size 2097152 / 2097152
  C:\SSDNVR2.BIN expected / actual size 2097152 / 2097152
  C:\READDATA\READINGS.DAT expected / actual size 70656512 / 70656512
*****************************************************
FILE SIZE CHECK PASSED
*****************************************************

*****************************************************
DRIVE INFO for D:
  OEMName      = *KBxeIHC
  Bytes/Sec    = 512
  Secs/Cluster = 8
  Rsvd Secs    = 1
  Num of FATS  = 2
  Root Ent Cnt = 512
  TotSec16     = 0
  Media        = 0xF8
  FATSz16      = 239
  Secs/Trk     = 32
  Num of Heads = 64
  Hidden Secs  = 32
  TotSec32     = 489440
  DrvTypeNum   = 128
  Reserved1    = 0x0
  BootSig      = 0x29
  VolID        = 365958411
  Vol Label    = ZIP250
  FileSysType  = FAT16
  --- Computed data ---
  FAT Type     = 16
  FAT Size     = 239
  Total Secs   = 489440
  Bytes/FATEnt = 2
  RootDirSector= 479
  RootDirSectrs= 32
  DataSector   = 511
  ClusterSector= 511
  EOCMark     >= 0xFFF8
  BADSectorMark= 0xFFF7
  Cluster 2 sector = 511
*****************************************************


*****************************************************
SCANDISK D:
  Time = 10/12/01 09:14:32
---------------------------
 CHECK DIRECTORY STRUCTURES
---------------------------
    File ZIP250
    File 100-1D.RKP
    File 100-1E.RKP
    File 100-1F.RKP
    Directory MTOUCH62
    Total Entries   5
    Deleted Entries 0
    Directories     1
    Cluster count   1

 Traverse subdirectory MTOUCH62
    Directory .
    Directory ..
    File MCAL.BAT
    File MCAL.OVL
    Total Entries   4
    Deleted Entries 0
    Directories     2
```

```
    Cluster count   1

---------------------------
 CHECK FILE STRUCTURES
---------------------------
    Check file 100-1D.RKP
    Check file 100-1E.RKP
    Check file 100-1F.RKP
Traverse subdirectory MTOUCH62
    Check file MCAL.BAT
    Check file MCAL.OVL
---------------------------
 CHECK FREE SPACE
---------------------------
  Check free space for clusters 2 to 61117
*****************************************************
SCANDISK PASSED for drive D:
  Time = 10/12/01 09:14:34
*****************************************************
```

[9] Misc

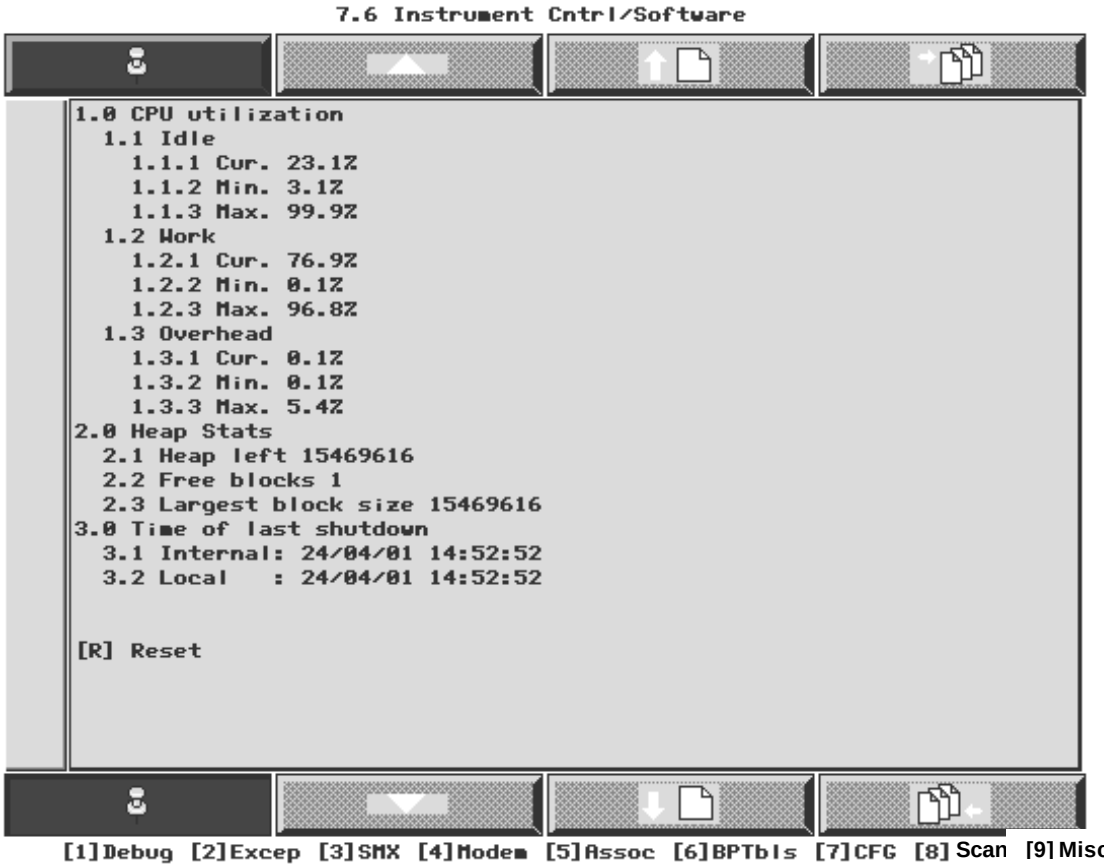

Fig. 90 - 7.6 Instrument Cntrl/Software Test Screen – Misc.

Display values	
1.1	Percentage of time the processor is idle
1.2	Percentage of time processor is executing task code
1.3	Percentage of time processor is executing interrupts of operating system code
2.1	Amount of bytes left in heap
2.2	Number of free blocks in heap
2.3	Largest block left on heap in bytes
3.1	Approximate CMOS clock value the last time the instrument controller software was terminated.
3.2	Approximate local time the instrument controller software was terminated.

RECOVERING FROM TIMESTAMP FAULTS

When replacing a CPU board, it is crucial to transfer the CMOS date/time from the old board to the new board, however; of course, this is not possible if the old board is not functioning. Consequently, when the instrument is powered up, it is possible that timestamp faults <**71**> are reported. This diagnostic screen provides the best chance of fixing the CMOS time as follows:

1) If **71** faults appear, turn off the instrument.
2) Go to this diagnostic screen and note the date and time on line 3.1

3) Determine the amount of time that the instrument was down and add that to date/time from step 2
4) **Exit** the 3D software
5) Enter the time from step 3 into the CMOS clock
6) Restart the 3D software

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4.9 ALIGNMENTS AND CALIBRATIONS

4.9.1 Overview

This section provides procedures for verifying calibrations. It also provides procedures for adjustments and alignments, as necessary.

4.9.2 System Power Supply

Refer to Subsection 4.9.6 to perform System Power Supply Check and Adjustment. Adjust, *only if required.* The measured voltage shall be + 5.2 VDC ± .05 VDC.

4.9.3 Temperature

The Incubation Chamber temperature should be calibrated if the actual temperature (measured with a calibrated thermometer) varies by ± 0.5° C from the instrument's set point temperature.

4.9.4 Optics

Bottle racks are pre-calibrated at the factory, and while they are designed not to require any re-calibration in the field, an initial calibration is required for validation purposes.

4.9.5 Rack – Single Cell Calibration

Rack cells can be individually calibrated using the **Incubation Module/Flag Check** diagnostic. This method of calibration will enable cells that are currently testing to remain operational, while concurrently calibrating rack cells that are out of calibration.

1. Starting from the "Main Screen", **click** on the [*Next*] button in the lower right corner of the screen to access the [*Setup*] screen.
2. Using the numbered buttons at the top of the [*Setup*] screen, enter the password **<1><2><1><2><3><4><3><4>** and **click** the [*Key Icon*] button to access the "Diagnostic Selection screen". (Refer to Figure 91 - Diagnostic Test Selection Screen).

4.9.5 Rack – Single Cell Calibration (Continued)

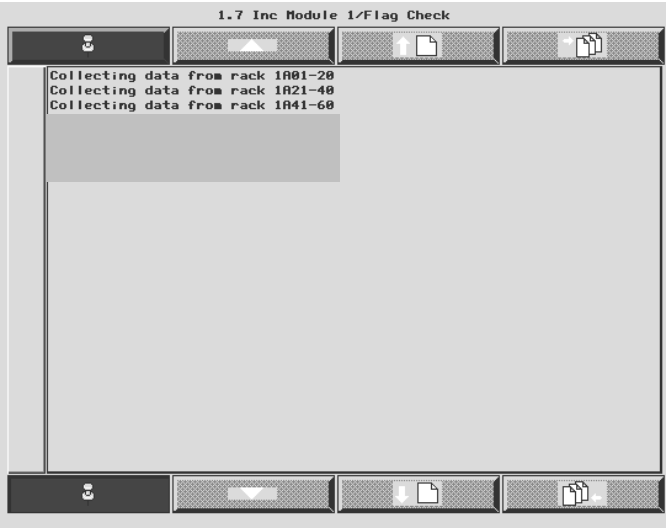

Fig. 91 - Diagnostic Test Selection Screen – Flag Check

3. Select the Incubation Module (**1.0 Inc Module 1**) from the Main Selection List, then select **1.7 Flag Check.**
4. **Click** the [*Right_Arrow*] button to start the cell flag check diagnostic. Allow enough time for the diagnostic to gather flag readings. When the diagnostic completes, the screen in Figure 91 appears.

4.9.5 Rack – Single Cell Calibration (Continued)

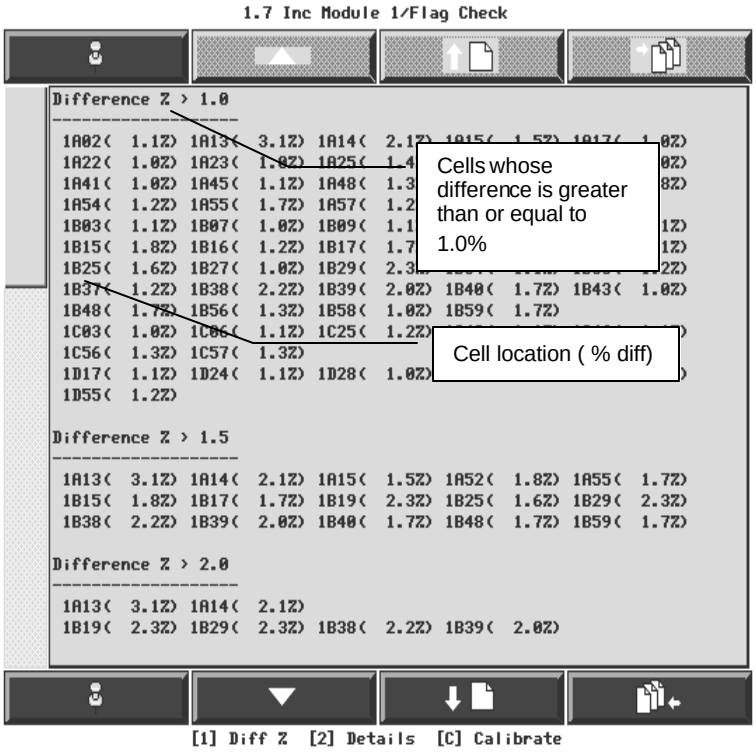

Fig. 92 - Incubator Flag Check – Cell Differences Screen

5. Observe cells displayed in the “Differences %> 1.5” section on the screen (use the **Scroll Up/Down** buttons to find this section, if necessary). Write down the cell numbers or (if printer is available) print out the list of cell numbers by **clicking** the [*Print*] button.
6. **Enter** <C> from the keyboard to go to the “Calibrate” screen. (Refer to Figure 93 - Flag Check Cell Calibration Screen).

4.9.5 Rack – Single Cell Calibration (Continued)

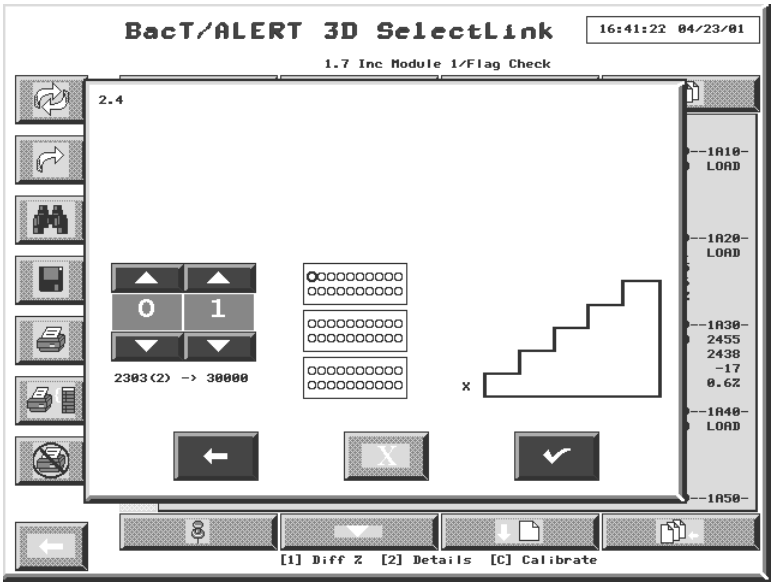

Fig. 93 - Flag Check – Cell Calibration Screen

7. Input (select the menu buttons) Rack and Cell that require calibration by choosing the appropriate cell (1-60) with the cell scroll buttons.

The first screen displays an **X** at the bottom of the staircase icon. This prompts the user to verify the cell is empty and the instrument's door is closed. Close the door before going to **Step 8**.

8. **Click** the [*Check*] button.

> **NOTE**
> The rack and cell scroll buttons will be grayed out and inactive until calibration of the cell is complete.

9. If instrument fault code **#20** appears on the top of the [*Calibrate Staircase*] icon, the door is not closed. Close the door to clear error code **#20** and **click** on the [*Check*] button again. **Note**: If door is left open more than 2 minutes, error **#20** will reappear.
10. Insert the Standard Number One into the selected cell. (A single ring around the end of the reflectance standard identifies Standard #1).
11. **Click** the [*Check*] button. "#2" will appear above the second step of the [*Calibration Staircase*] icon.
12. Insert Standard Number Two into the selected cell. (Two rings around the end of the reflectance standard identify Standard #2).

4.9.5 Rack – Single Cell Calibration (Continued)

13. **Click** the [*Check*] button. "#3" will appear above the third step of the [*Calibration Staircase*] icon.
14. Insert the Standard Number Three into the selected cell. (Three rings around the end of the reflectance standard identifies Standard #3).
15. **Click** the [*Check*] button. "#4" will appear above the fourth step of the [*Calibration Staircase*] icon.
16. Insert Standard Number Four into the selected cell. (Four rings around the end of the reflectance standard identifies Standard #4).
17. **Click** the [*Check*] button.
18. If a check mark appears at the top of the [*Calibration Staircase*] icon, then the calibration of the cell was successful. Remove the Standard Four and **click** the [*Check*] button to save the new calibration values.

If instrument fault code **#60** appears at the top of the [*Calibration Staircase*] icon, then the calibration of the cell was unsuccessful. **Press** the [*Cancel*] button and follow Steps 7 – 18 to recalibrate the cell.

If a fault code **#20** appears at the top of the screen, the door has been open too long. Close the door, **click** [*Cancel*], and follow Steps 7-18 again within two (2) minutes.

NOTE
The calibration process can be canceled, and any new calibration values discarded, by pressing the [*Cancel*] button at any time during the calibration process.

19. **Click** the [*Previous Screen*] button to return to the "Flag Check Diagnostic" screen.

4.9.6 System Power Supply Check and Adjustments

The DC Power Supply is mounted on the System Power Panel (located on the right-hand side of the 3D 60's chassis). (Refer to Figure 93). A metal housing encloses the DC Power Supply. Since the adjustment POT (Refer to Figure 97) is only accessible through a hole in the metal housing, the instrument's top and right side panels must be removed to facilitate maintenance.

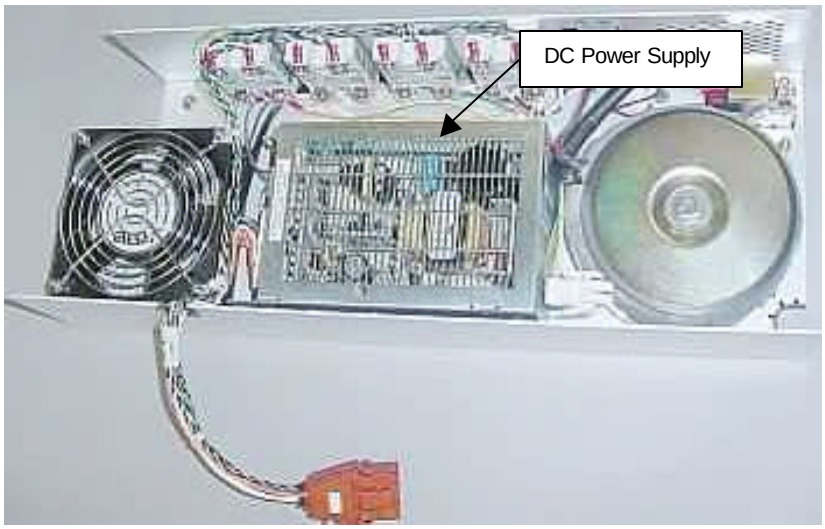

Fig. 94 - System Power Panel and DC Supply

1. It is recommended that you perform a Backup of the records stored on the BacT/ALERT 3D 60 before continuing this procedure. (Refer to Subsection 4.5 for BacT/ALERT 3D 60 Data Backup/Restore Procedure.)
2. Go to the **C:** (DOS) prompt and do not turn the instrument off.
3. Open the door on the 3D 60 to stop the instrument.
4. Remove the two screws securing the Top Panel and secure it into the "Up" position. (Refer to Figure 99 for Top Panel Screw locations.)
5. On the ModSig PCBA, connect both of the DC voltmeter's POS (RED) lead and the NEG (BLACK) lead to respective VCC (Orange Wire) and Ground (White Wire) on JP31, located in the bottom right corner. (Refer to Figure 96 for +5VDC Test Points).

WARNING
ENERGIZED CIRCUITS AND COMPONENTS POSE AN ELECTRICAL SHOCK HAZARD. DO NOT SHORT THE VOLTMETER'S TEST LEADS TOGETHER WHEN TAKING VOLTAGE MEASUREMENTS AT JP31

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

4.9.6 System Power Supply Check and Adjustments (Continued)

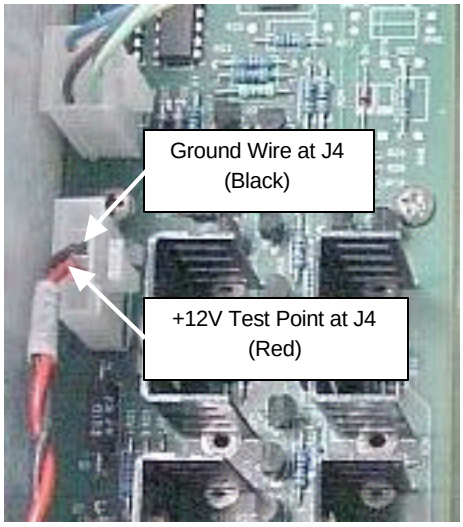

Fig. 95 - Step-5 PCBA at Connector J4

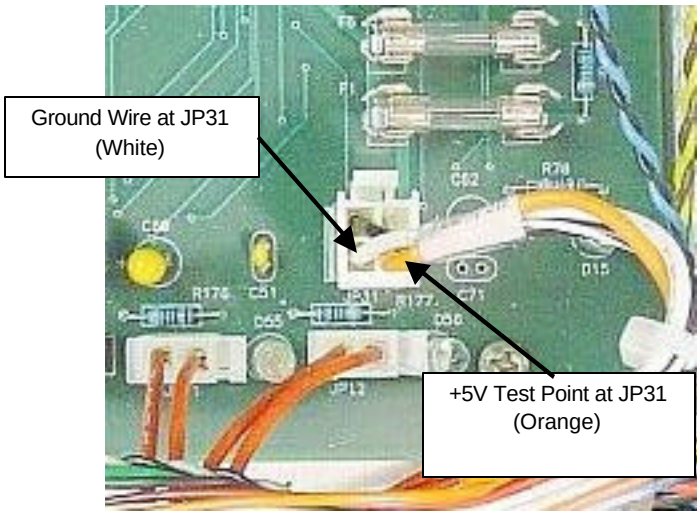

Fig. 96 - ModSig PCBA with +5 VDC Test Points

6. The measured voltage shall be +5.2 ± .05 VDC. (Refer to Figure 96)
7. If the voltage reading is out of tolerance, insert a plastic wand into the POT access hole (Reference Figure 97, below). While observing the voltage reading, adjust the POT until it meets the voltage specification in Step 6 above.
8. Although adjustments are not required, there should be +12V at J4 on the Step-5 PCBA. The measured voltage tolerance should be within ±1V DC.

NOTE

Do not make any adjustments if the voltage meets specifications.

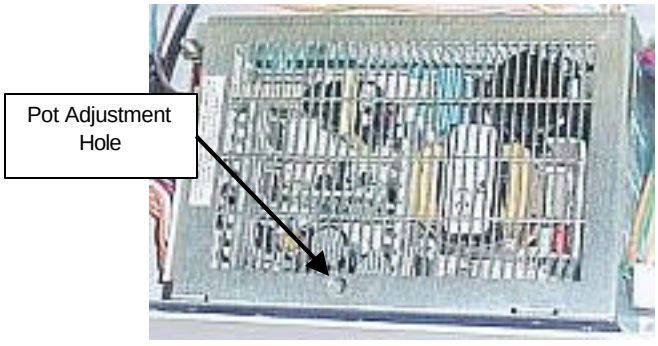

Fig. 97 - DC Power Supply

4.9.6 System Power Supply Check and Adjustments (Continued)

9. Remove the voltmeter's test leads from JP31 on the ModSig PCBA.
10. Close the Top Panel and replace the two screws that secure it. (Refer to Figure 99)
11. Close the door on the instrument.
12. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
13. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
14. Annotate appropriate maintenance and logbooks.
15. Return the system to normal operation.

4.9.7 Door Micro Switch 1 & 2 Checks

1. Go to the **C:** (DOS) prompt but do not turn the unit off.
2. Open the door on the 3D 60 to stop the instrument.
3. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for Top Panel Screw locations.)

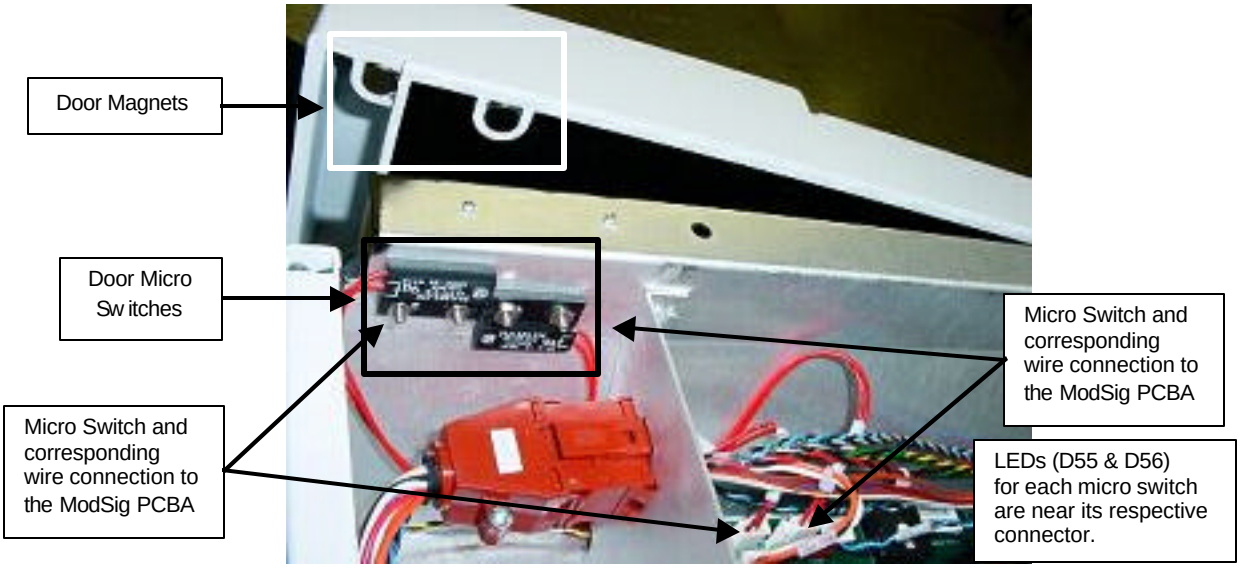

Fig. 98 - Door Micro-Switches and Magnets

4. With the instrument’s door open, check LEDs D55 and D56 on the ModSig board to ensure they are not lit.
5. Close the door and check the LEDs to ensure both are illuminated. If either LED is not illuminated, follow the Repair and Replace procedures outlined in Subsection 4.10.27 – Magnetic Door Switches to replace the defective switch.
6. Close the Top Panel and replace the two (2) screws that secure it. (Refer to Figure 99)
7. Return the system to normal operation.

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4.10 REMOVE AND REPLACE PROCEDURES

4.10.1 Introduction

This section describes the procedures for the repair and replacement (assembly and disassembly) of the various components of the instrument. Typically, the component repair list below will coincide with the components in the system's spare parts list in Appendix B of this manual. Included below is a comprehensive list of the components that may require repair and/or replacement.

The assembly and disassembly of each component is covered by the following:

- **Tools:** the tools required for the assembly and disassembly of the component in question.
- **System Power Down Procedure:** follow procedure in Section 4.3.2 for BacT 3D 60 Power Down.
- **Disassembly:** step-by-step component disassembly procedure.
- **Assembly:** step-by-step component assembly procedure.
- **Assembly and disassembly diagram:** diagram(s) identifying the parts indicated in the assembly and/or disassembly paragraphs.
- **System Power Up Procedure:** follow procedure in Section 4.3.3 for BacT 3D 60 Power Up.

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4.10.2 CPU PCBA Assembly (P/N 750-0070-01)

1. Perform the following steps:
   a. Look at the “Main Screen” on the instrument controller icon and write down the following information:
      - Software version
      - Bottle counts
   b. Make a backup (Refer to Section 4.5, Data Backup/Restore Procedures)
   c. Exit the BTA 3D 60 software by **pressing** the <ESC> key and **typing**, <Y> <E> <S>.
   d. **Write down** the CMOS date and time. This can be accomplished by rebooting the instrument. While it is powering up, **press** the <Delete> key to enter the CMOS setup menu.
   e. **Write down** the local time.
2. Open the door on the 3D 60 to stop the instrument.
3. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
4. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99, below, for screw removal locations.)

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

Fig. 99 - Top Panel Screw Locations (Removal)

4.10.2 CPU PCBA Assembly (P/N 750-0070-01) (Continued)

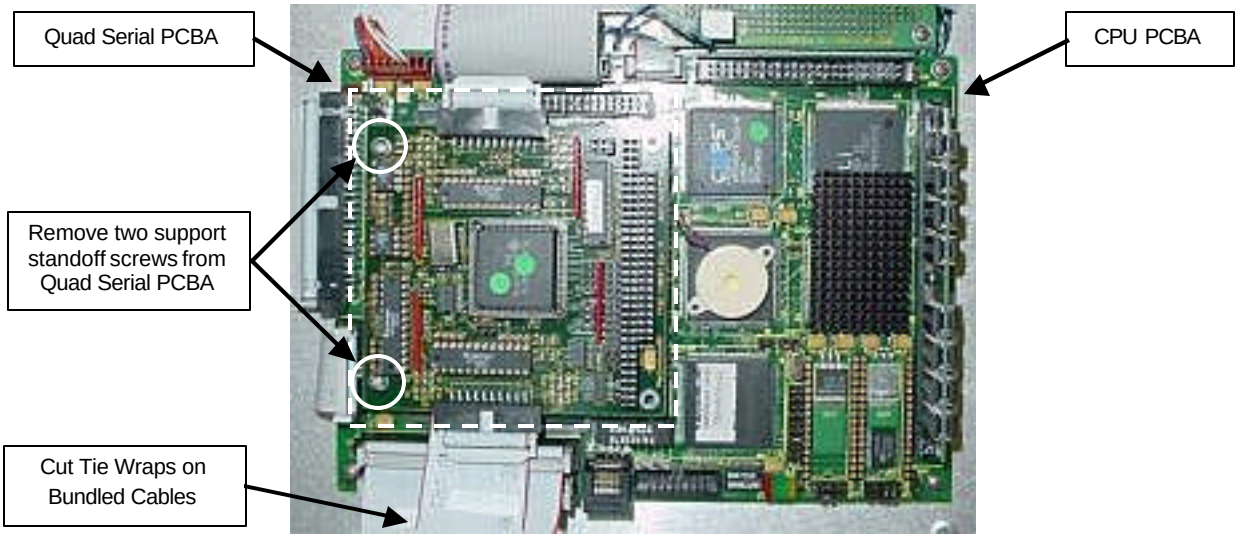


Fig. 100 - CPU PCBA w/Quad Serial PCBA plugged in

5. Cut and remove the tie wraps from the bundled set of cables.
6. Remove the two (2) screws securing the Quad Serial PCBA to the CPU PCBA. (Refer to Figure 100)
7. Unplug the Quad Serial PCBA from the CPU PCBA and lay it down. (Refer to Fig 101)
8. Unplug cables from the following locations (preferably in the following order):
   a. WinJ3 from connector J3
   b. WinP2 from connector J2
   c. WinP7 from connector J7
   d. P18 from connector J18
   e. P27 from connector J27
   f. J5 from connector J5
   g. J4 from connector J4

Refer to Figure 104 and Figure 105 for Steps 9a thru 9g (CPU PCBA cable connections.)

4.10.2 CPU PCBA Assembly (P/N 750-0070-01) (Continued)

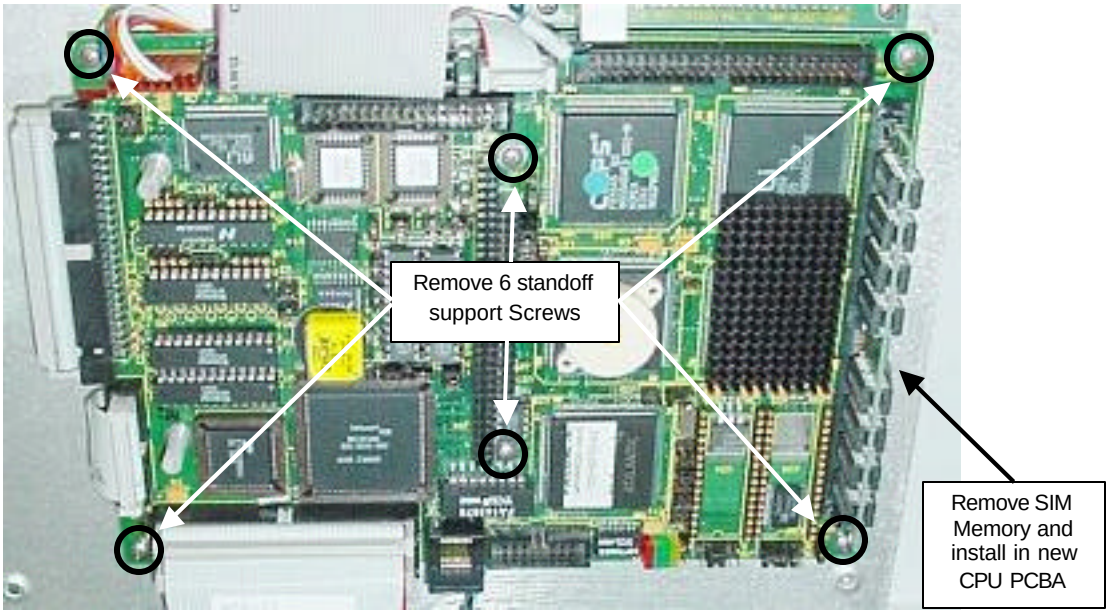


Fig. 101 - CPU PCBA – Screw Removal

9. Remove six (6) screws securing the CPU PCBA to the support standoffs. (Refer to Figure 101)

CAUTION

Hold on to the screws as you remove them from the CPU PCBA. Screws can fall underneath the ModSig PCBA and may require removal of the ModSig board to recover them.

10. Transfer the SIMM memory (plugged into the SIM1 connector) from the defective CPU board into the new CPU PCBA being installed.

4.10.2 CPU PCBA Assembly (P/N 750-0070-01) (Continued)

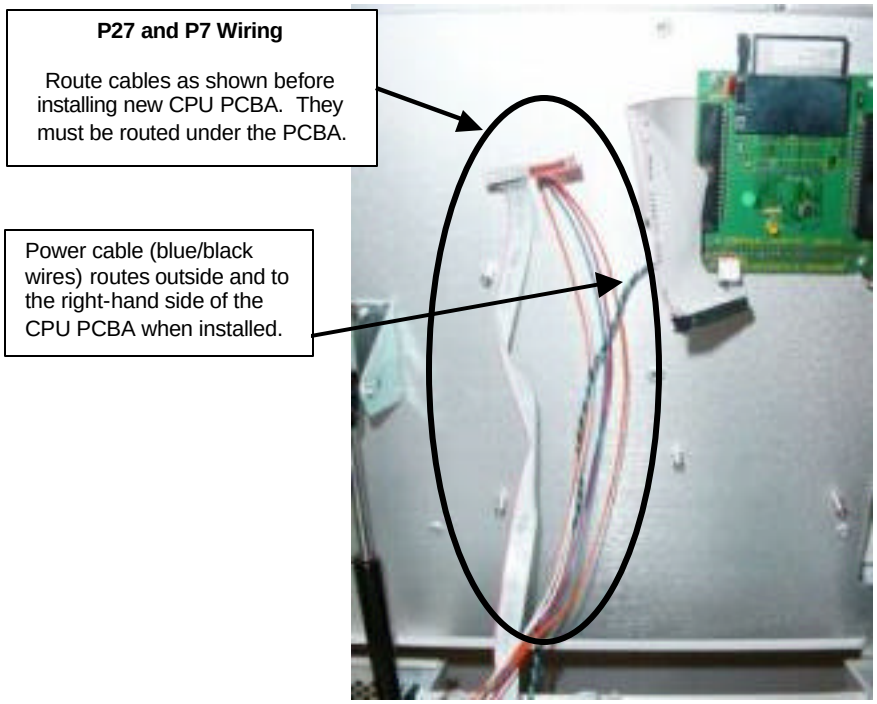


Fig. 102 - CPU PCBA – J27 and J7 Cable Routing

NOTE

- P27 wire must be routed inside the left standoff before installing the new CPU PCBA
- Do not overtighten standoff support screws when reinstalling the CPU board.
- WinJ3 cable goes underneath the CPU PCBA before securing the PCBA with screws.
- P7 (blue/black) power cable goes to the right and outside of the CompactFlash Adapter PCBA.

11. Ensure that P27 wire is routed inside the left standoff and under the PCBA, before securing the PCBA to the support standoffs with screws. (Refer to Figure 102)
12. Ensure that P7 wire is routed outside the CompactFlash PCBA and perpendicular to the connector before securing the PCBA to the support standoffs with screws. (Refer to NOTE above. Cables do not route underneath the CompactFlash PCBA.)
13. Align the new CPU PCBA to the support standoffs and install six (6) screws. (Refer back to Figure 101)

4.10.2 CPU PCBA Assembly (P/N 750-0070-01) (Continued)

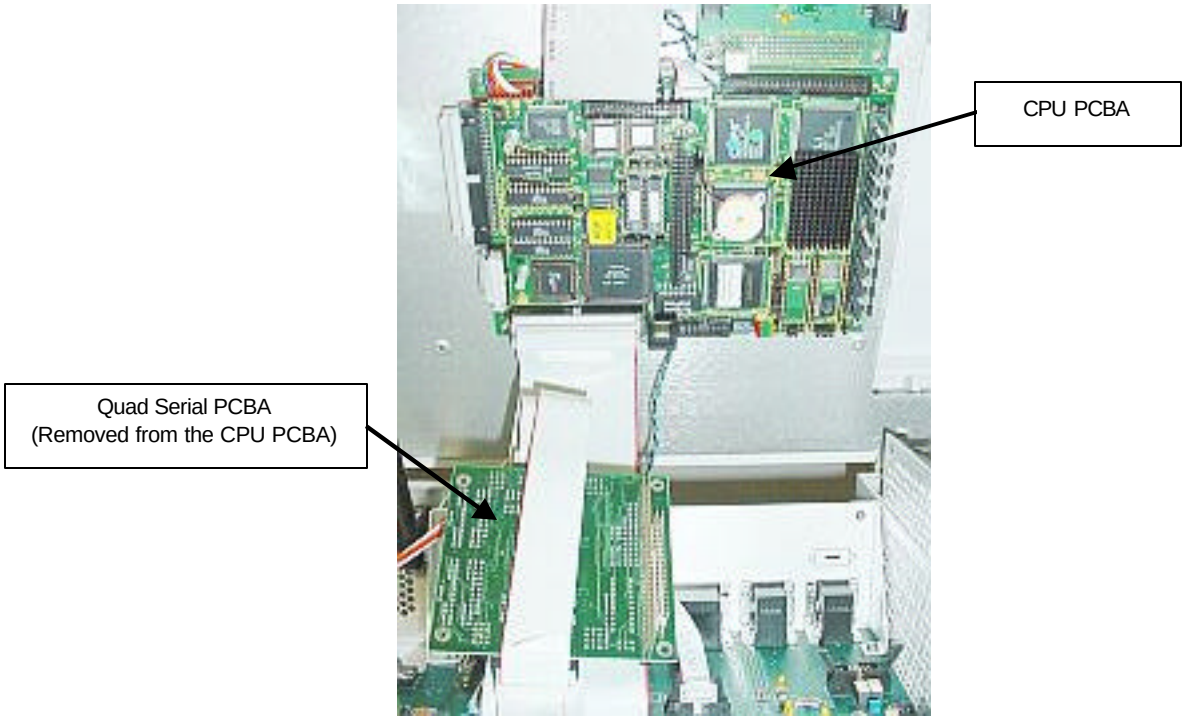


Fig. 103 - Quad Serial PCBA Removed from CPU PCBA

14. Plug Quad Serial PCBA into the CPU PCBA. Ensure the pins on the CPU PCBA are aligned to the female connector on the Quad Serial PCBA (as to not bend them or offset them).
15. Install the two (2) screws securing the Quad Serial PCBA to the CPU PCBA. (Refer to Figure 100)
16. Plug all cables back in that were unplugged in Step 9 on page 4-82 of this section. Go back and refer to Step 9 for identification of each cable. Refer to Figure 104 and Figure 105 for the proper cable connections.

4.10.2 CPU PCBA Assembly (P/N 750-0070-01) (Continued)

NOTE

Ensure that you know the location of the connector that each cable plugs in to so that each one can be reconnected into its proper place once the new CPU PCBA is installed. Move to Step 9 for cable connections and locations to reconnect cables to the new CPU PCBA.

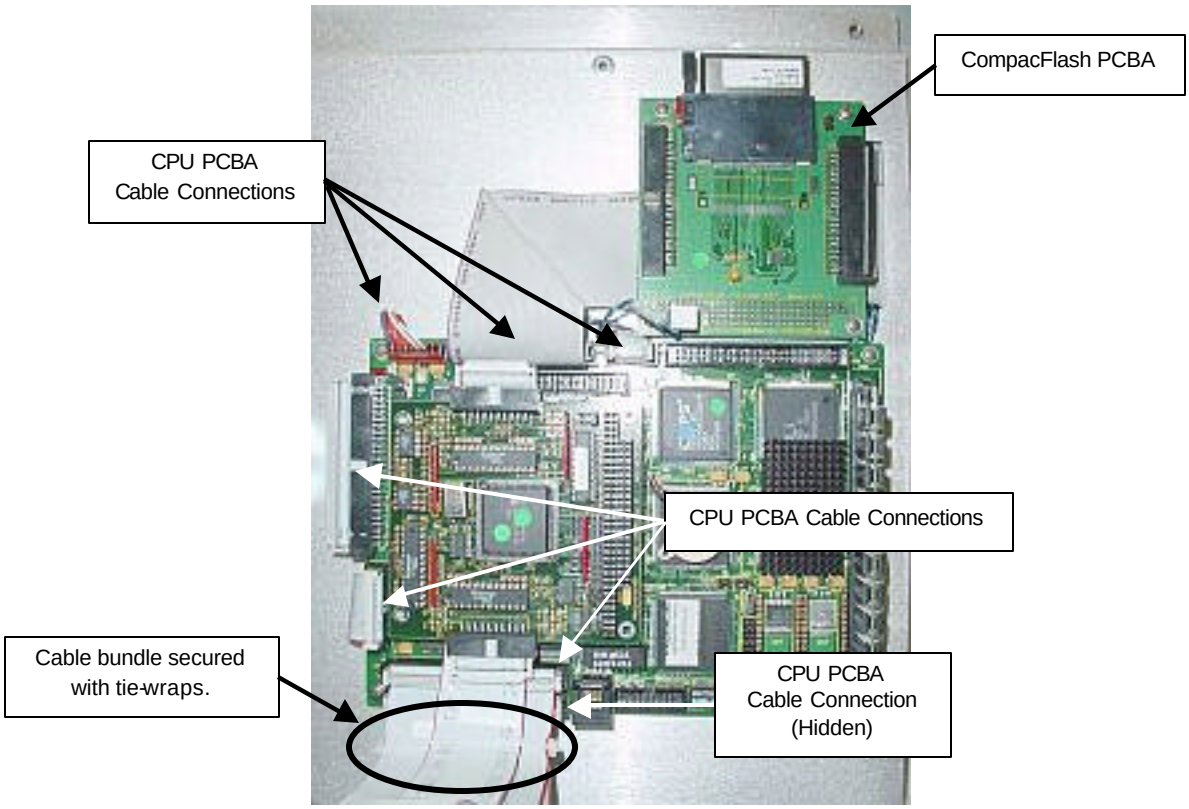


Fig. 104 - CPU PCBA Cable Connections

17. Align the bundled cables unplugged in previous Step 9. Secure cable J7 underneath Ser1-P3 cable and WinJ5 cable. (Refer to Figure 104)
18. Add tie wraps around the bundled cables. Ensure that cable bundle is reasonably aligned and flat prior to tightening the tie wraps. (Refer to Figure 104)

4.10.2 CPU PCBA Assembly (P/N 750-0070-01) (Continued)

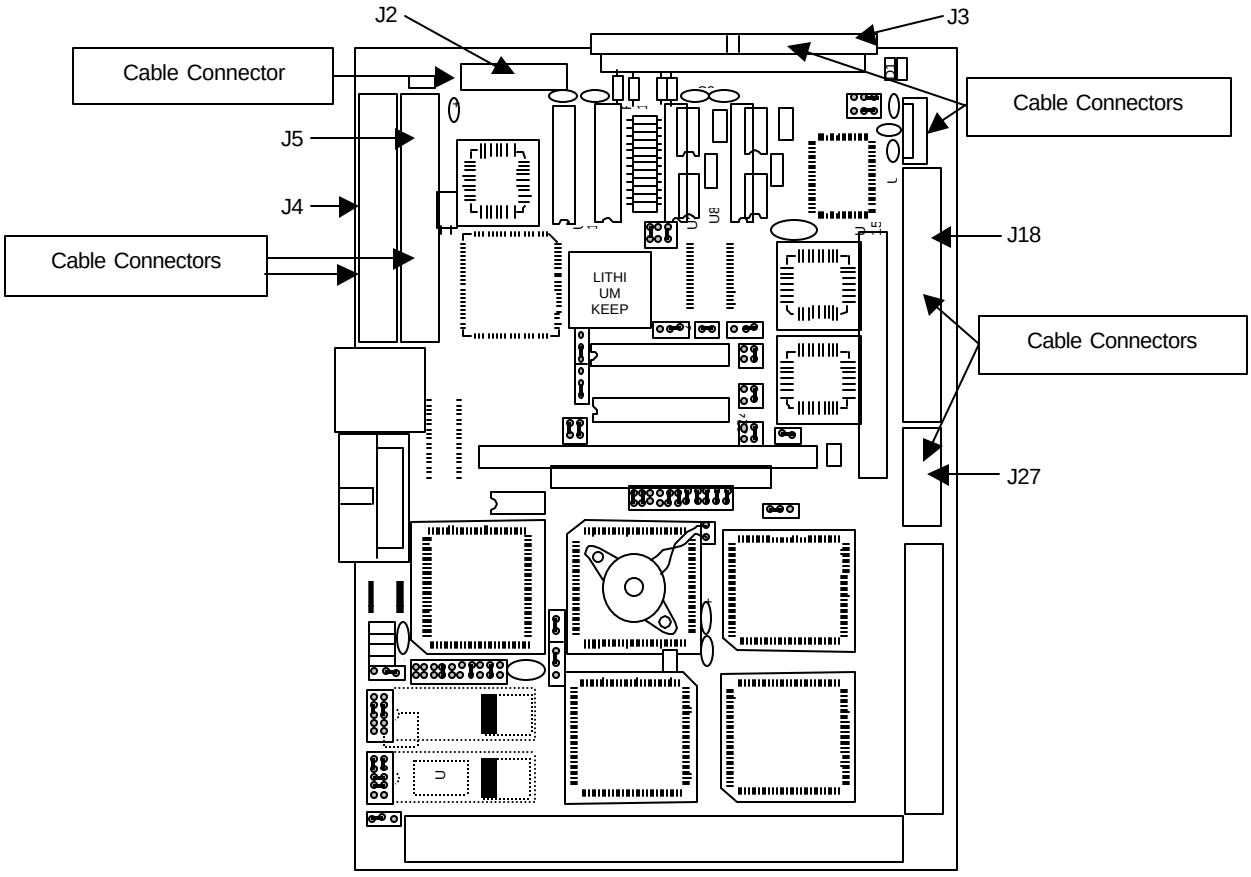


Fig. 105 - WinSystems® CPU Connector Locations

19. Close the Top Panel and replace the two (2) screws that secure it. Ensure that the cables have a forward fold at the ModSig connectors as to not allow the cables to get pinched between the Top Panel and the chassis (hinge opening). (Refer to Figure 99)
20. Connect the Main Power cable to the instrument.
21. Apply power to the instrument. (Refer to Subsection 4.3.3 for 3D 60 Power Up procedure.)

CAUTION

To ensure proper software settings and compatibility, the BacT/ALERT 3D 60 Installation and Utilities disk should be labeled as the same software version as the customer was previously using.

4.10.2 CPU PCBA Assembly (P/N 750-0070-01) (Continued)

22. As the instrument is rebooting, **press** the <Delete> key to enter the CMOS setup menu.
    a. If the CMOS date and time were noted in Step 2d, set the CMOS date and time to the time noted in Step 3d plus the elapsed time. Specifically, you want the local time right now minus the local time noted in Step 2e.
    b. If the CMOS date and time were not noted in Step 2d, the CMOS date and time should be set to Universal Coordinated Time (formerly known as GMT; Greenwich Mean Time).
23. Reboot the system by **pressing** <Ctrl> + <Alt> + <Delete> keys simultaneously.
24. Look at the “Main” screen on the instrument controller and verify the correct version of software is displayed.
25. Set the display time to the local date and time using the “Set Date and Time” screen (See BacT/ALERT 3D 60 Operator’s Manual)
26. Allow the “Power Up” screen to complete.
27. Verify the bottle counts, if notated in Step **2d** of this section.
28. If the system has been down for more than one hour, call bioMerieux for technical support assistance.

4.10.3 Quad Serial Interface PCBA (P/N 750-0075-01)

1. Although not required, it is advisable that you perform a backup of the records stored on the 3D 60 instrument. (Refer to Section 4.5 – Data Backup/Restore Procedures)

> Only 250 Megabyte Zip disks should be used as the backup media.

2. Open the door on the 3D 60 to stop the instrument.
3. Refer to Subsection 4.3.2 and perform the BacT 3D 60 Power Down procedure.
4. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for Top Panel screw removal.)

> **CAUTION**
> **Proper ESD precautions must be observed whenever working on or around any PCBA.**

5. Disconnect the Ser1-P3 cable from the Quad Serial PCBA. (Refer to Figure 107)
6. Remove the two screws securing the Quad Serial board to the nylon standoffs. (Refer to Figure 107)
7. Carefully unplug the Quad Serial PCBA from the CPU PCBA and hold on to it securely.

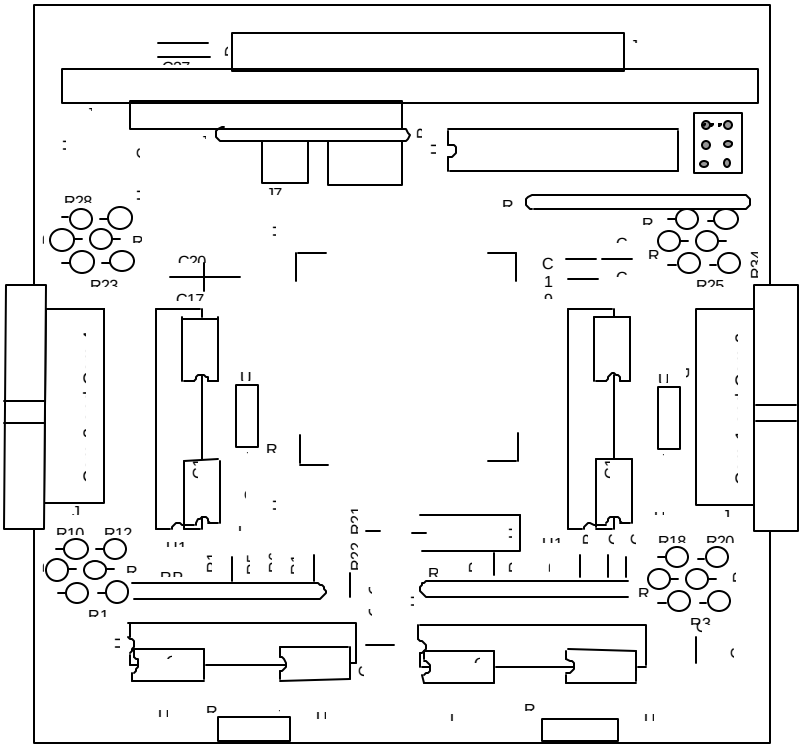


Fig. 106 - Quad Serial PCBA

4.10.3 Quad Serial Interface PCBA (P/N 750-0075-01) (Continued)

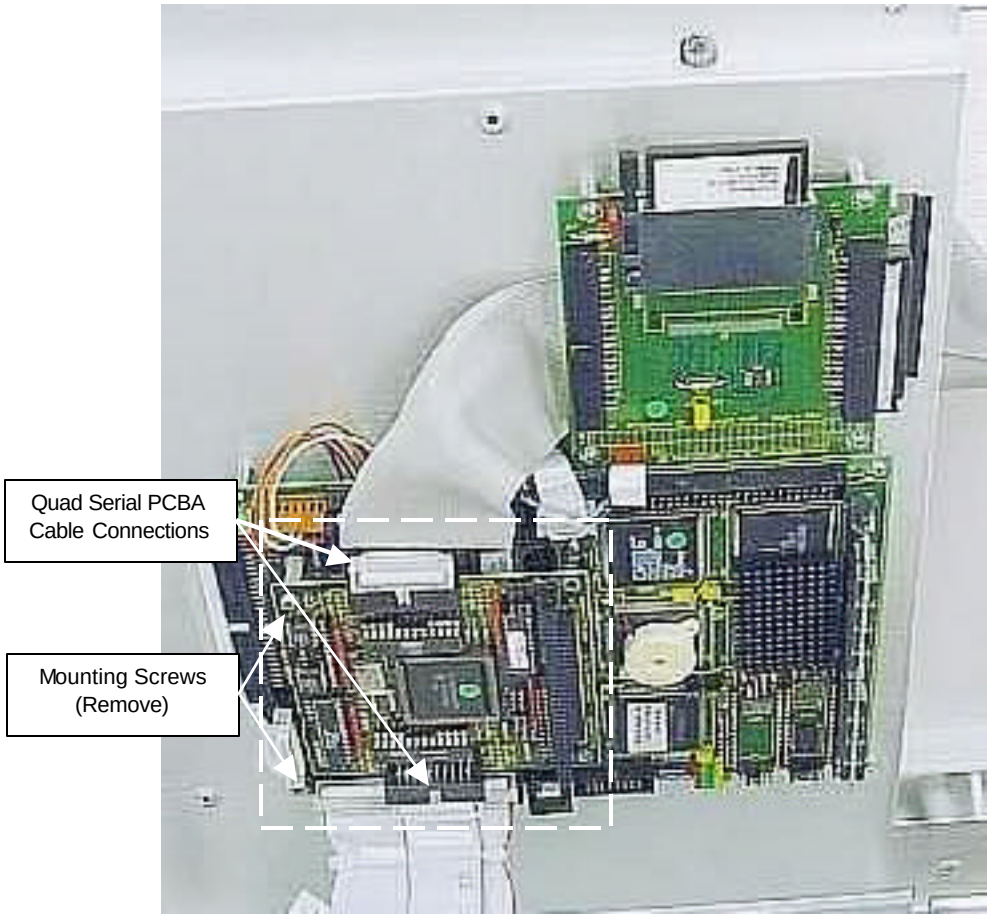


Fig. 107 - Quad Serial PCBA Cable Connections

8. Unplug the P6 cable and set the Quad Serial board aside. (Refer to Figure 107 above)
9. Reverse the steps to install a new Quad Serial PCBA. Refer to Figure 106 and Figure 107 for proper cable and connector locations.
10. Close the Top Panel and replace the two (2) screws that secure it. (Refer to Figure 99)
11. Close the door on the 3D 60 to allow startup of the instrument.
12. Refer to Subsection 4.3.3 and perform 3D 60 Power Up procedure.
13. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
14. Annotate appropriate maintenance and lab logbooks.
15. Return system to normal operation.

4.10.4 CompactFlash Adapter PCBA (P/N 957-0004-356)

1. It is recommended that you perform a Backup of the records stored on the BacT/ALERT 3D 60 before continuing this Remove and Replace procedure. (Refer to Subsection 4.5 for BacT/ALERT 3D 60 Data Backup procedure.)
2. Open the door on the 3D 60 to stop the instrument.
3. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
4. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99)

CAUTION

Proper ESD precautions must be observed whenever working on or around and PCBA.

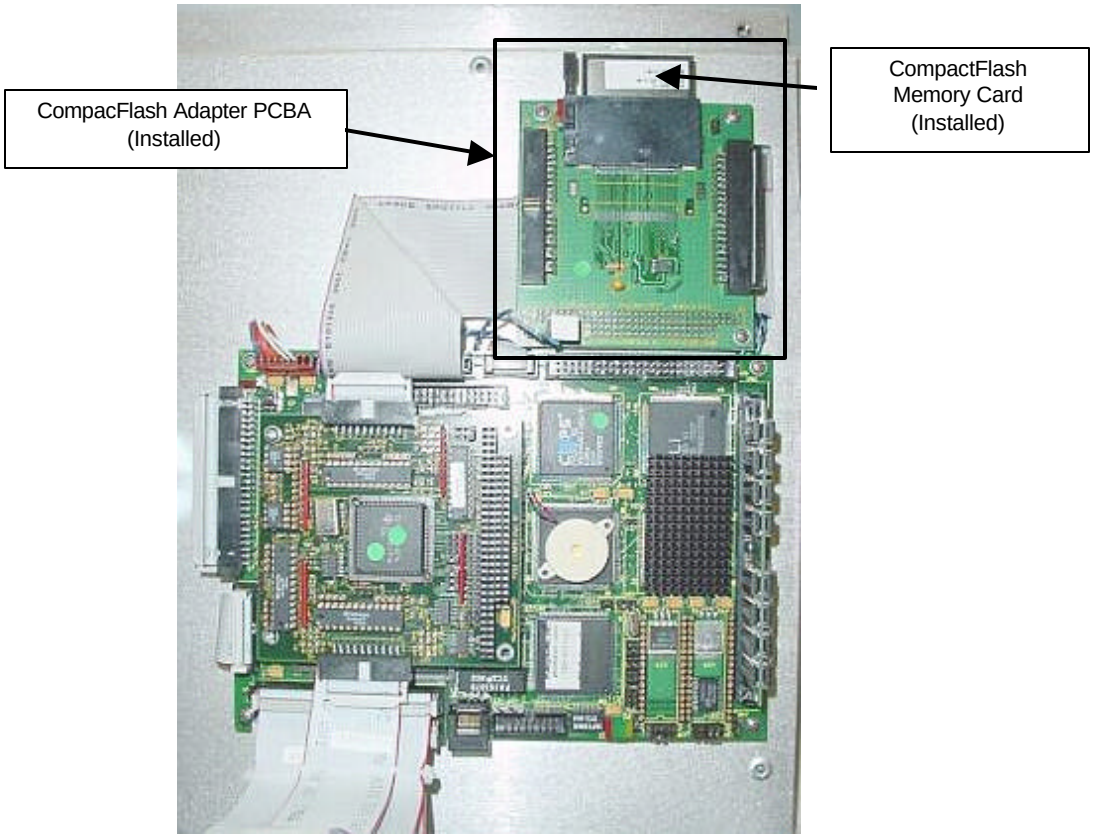


Fig. 108 - EMC –CompacFlash PCBA

Note: The IDE cable to the CompactFlash Adapter PCBA has a ferrite bead on it and this should be removed from a defective IDE cable and reinstalled on the new cable, as required.

4.10.4 CompactFlash Adapter PCBA (P/N 957-0004-356) (Continued)

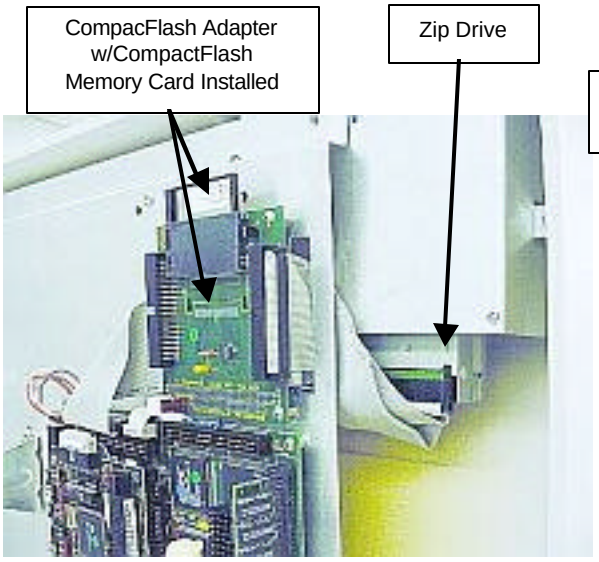


Fig. 109 - CompactFlash Adapter & Zip Drive Installed

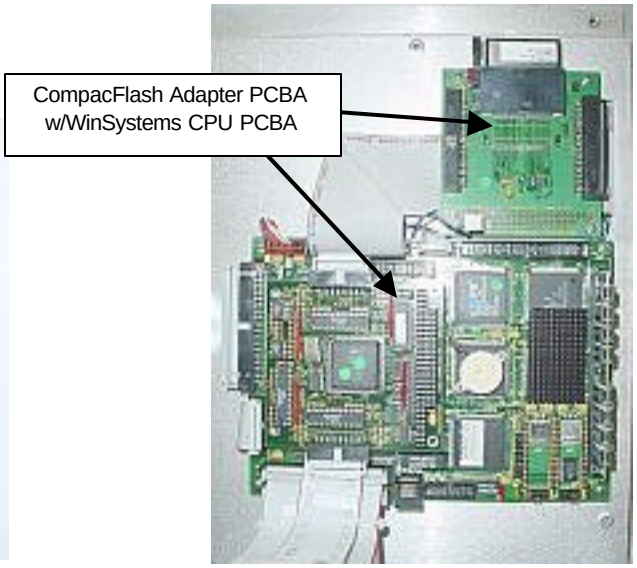


Fig. 110 - CompactFlash Adapter w/WinSystems Computer

5. Remove the CompactFlash Memory Card by pressing the black release plunger. Pull the Memory Card straight out of the CompactFlash Adapter and set it aside. (Refer to Figure 111 for CompactFlash Memory Card location and black arrow showing disk removal direction).
6. Unplug the J7 power cable from the CompactFlash Adapter PCBA. (Refer to Figure 111)
7. Remove the four (4) screws securing the CompactFlash Adapter PCBA to the support standoffs. (Refer to Figure 112)
8. Unplug the J3 cable from the CompactFlash Adapter PCBA. (Refer to Figure 112)

4.10.4 CompactFlash Adapter PCBA (P/N 957-0004-356) (Continued)

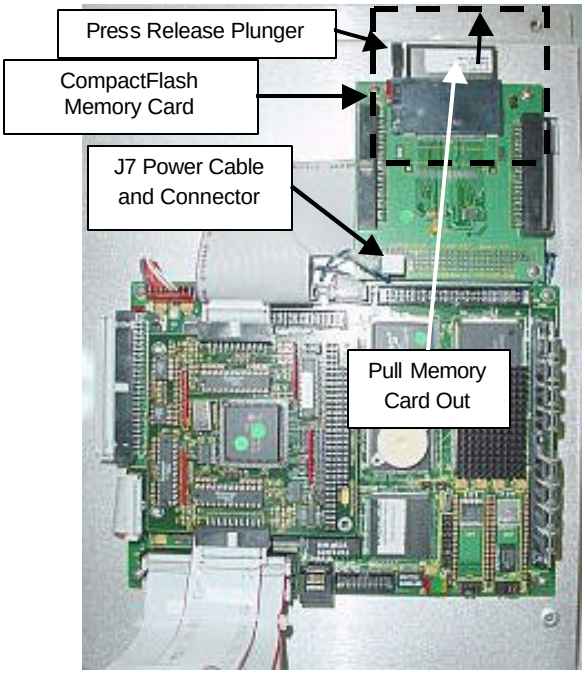


Fig. 111 - CompactFlash Card (Memory Removal)

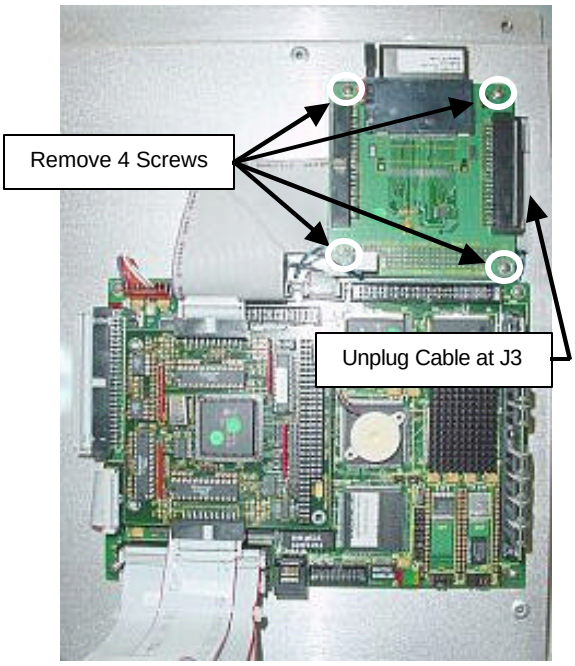


Fig. 112 - CompactFlash Adapter (Removal)

9. Reverse the steps to install the new CompactFlash Adapter PCBA.

> **NOTE**
> Ensure the J7 (Blue/Black) power cable is routed arount the **right side** and on top of the CompacFlash PCBA before replacing the mounting screws.

10. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.

Do Steps 11-15, below, only if the CompactFlash Memory Card is defective and requires replacement.

11. Insert the BTA3D “Installation and Utilities Disk” into the Zip drive.
12. Initialize the new CompactFlash Memory Disk by typing **D:INITBTL** at the **C:\>** prompt.
13. Refer to Subsection 4.5.2 and restore the 3D 60 backup data according to the Data Restore Procedure.
14. Remove the Zip disk that’s in the Zip drive and return it to its storage location.
15. Reboot the system by recycling the system power.
16. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
17. Annotate appropriate maintenance and logbooks.
18. Return the system to normal operation.

4.10.5 Software Installation and CompactFlash Memory Card Replacement

Use the following steps to replace the BacT/ALERT 3D 60 software in situations where memory and backup are current (known to be good), and you are updating the CompactFlash Memory Disk.

Omit the steps marked with an asterisk (*****) if the CompactFlash Memory Card is known to be defective or if the data is known to be corrupt.

1. ***** **Note** the contents of the bottle table from the “Main Screen”.
2. ***** **Note** the version of software shown in the instrument pictorial on the “Main Screen”.
3. ***** Perform a backup. Refer to Section 4.5 – Data Backup/Restore Procedures. Backup is not completed until the [*Backup Now*] button changes from gray to blue.

*** NOTE:** if errors appear, call the Support Center for assistance.

4. To exit the software **press** the <Esc> key and type in <Y> <E> <S>.
5. Shut down the power on the 3D 60 instrument from the Power Entry Module (PEM) on the rear of the instrument.
6. If the 3D 60’s Top Panel is not open, remove the two (2) screws that secure the Top Panel and open it. Refer to Figure 99 - Top Panel Screw Locations (Removal).
7. Eject the old CompactFlash Memory Card. (Refer to Subsection 4-10-4 - CompactFlash Card, Figure 111)
8. Insert the new CompactFlash Memory Card.
9. Restore power.
10. Remove the backup Zip disk.
11. Install the software using the BTA3D “Installation and Utilities Disk”.

    *** NOTE:** Check the software version (identified on the Utilities Disk label) is the same version as noted in Step 1, above.
12. Reboot the system by powering down (recycle) the instrument, however, when rebooting **press** the left <Shift> key as the instrument powers up. This keeps the system in DOS.
13. At the **C:\>** prompt, **type** ZIP and **press** the <Enter> key.

*** NOTE:** The following step will restore previous patient record data and may only be a useful step if the system has been turned off for an hour or less. You should call for technical assistance if the system has been down for more than one hour.

14. ***** Insert the Backup Zip disk into the Zip drive. At the **C:\>** prompt **type** Restore and **press** the <Enter> key.
15. Reboot the system by using the power switch (by turning it off and on again).
16. Verify the contents of the bottle table and the software version.
17. Wait 10 minutes to make sure no errors occur on the display screen such as Fault #19.
18. If Fault #19 occurs, call Technical Support.

4.10.6 ModSig PCBA (P/N 48300-1) (Order Spare P/N 48300-901)

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down. Unplug all peripherals.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

3. Starting at the upper left section of the PCBA, perform the following steps:
   a. Unplug MSJ2. This connector is keyed with a tab lock. (Refer to Figure 113)
   b. Unplug MSJP2 (Refer to Figure 113)
   c. Unplug JP10/P1 (Refer to Figure 113)

NOTE
JP4 and JP28 connectors have no cables connected to them.

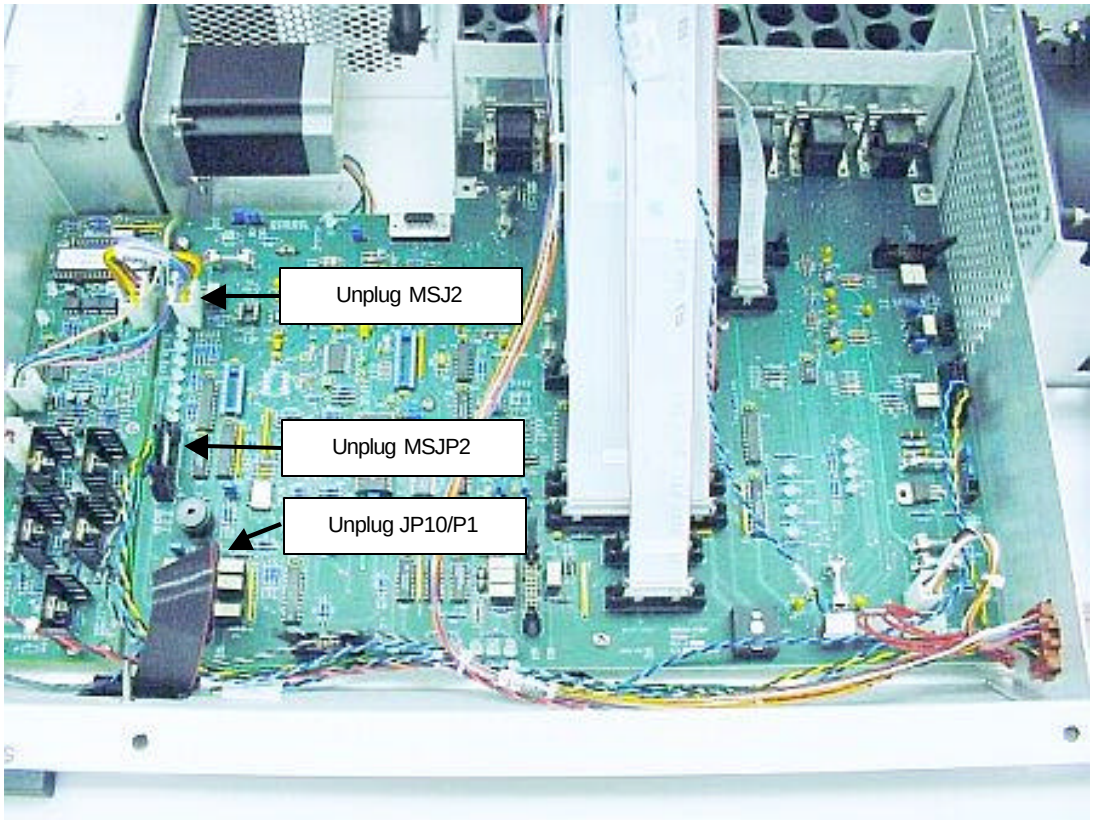


Fig. 113 - ModSig PCBA - Connector Location

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

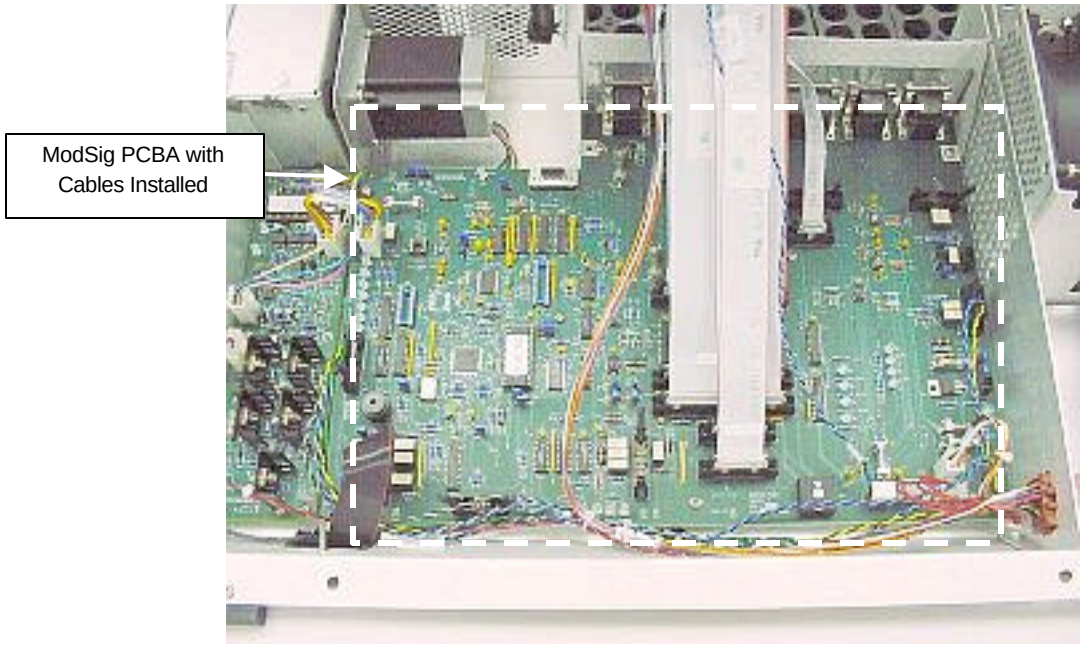


Fig. 114 - ModSig PCBA

4. Cut the ties wraps (Refer to Figure 115) and unplug the bundled cables in the following order:
   a. MS-JP30 from connector JP30
   b. MS-JP29 from connector JP29
   c. MS-JP18 from connector JP18
   d. MS-JP17 from connector JP17
   e. MS-JP13 from connector JP13
   f. MS-JP15 from connector JP15
   g. MS-JP19 from connector JP19 (Refer to Figure 117)
   h. JP21 (Blue/Black wires) (Refer to Figure 118)
   i. MS-JP11 and MS-JP12 (Refer to Figure 118)
   j. MS-JP31 (Refer to Figure 118)
   k. MS-JP1 (Blue/Black & Yellow/Brown wires) (Refer to Figure 119)

   Refer to Figure 116 for Steps 4a thru 4f.

   Refer to Figure 118 for Steps 4h thru 4j.
5. Remove the two (2) screws from the Rear Panel (Refer to Figure 120)
6. Remove the eight (8) screws that secure the ModSig PCBA to the support standoffs. (Refer to Figure 121)
7. Unplug MCJ4 cable from the J4 connector on the Step-5 PCBA. (Refer to Figure 122)
8. Remove the ModSig PCBA from the instrument.

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

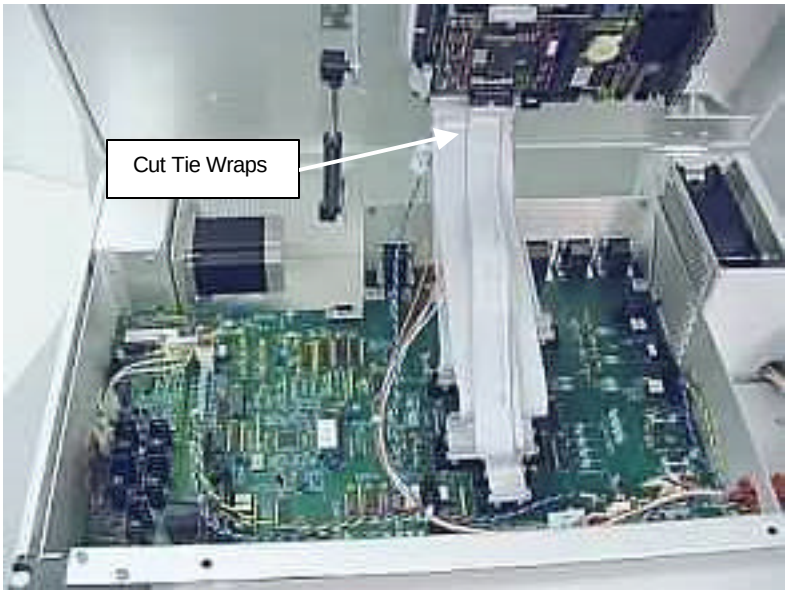


Fig. 115 - ModSig PCBA - Tie Wrap Removal

NOTE
JP10/P1 and the ground cables must be pulled up in order to insert the ModSig PCBA.
(Refer to Figure 124)

9. With the ModSig PCBA removed from the instrument, remove rear bulkhead from the ModSig PCBA. Remove two (2) each hex nuts from the left and right sides of the **LIS**, **Mouse** and **Barcode** ports on the rear bulkhead. (Refer to Figure 123)
10. Remove the knurled nut from the **Ext Speaker** port. (Refer to Figure 123)

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

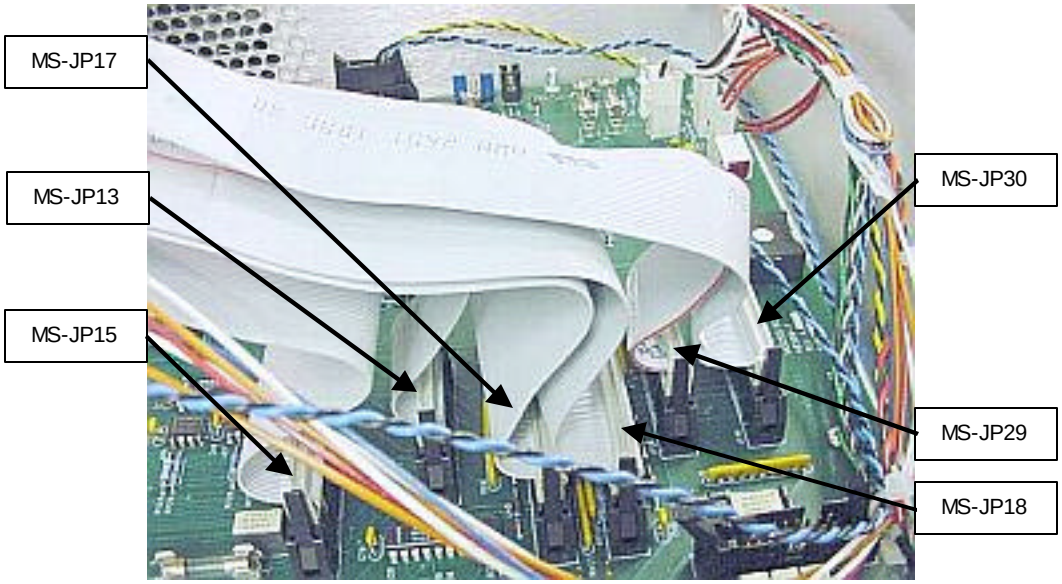


Fig. 116 - ModSig PCBA - Bundled Cable Disconnection

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

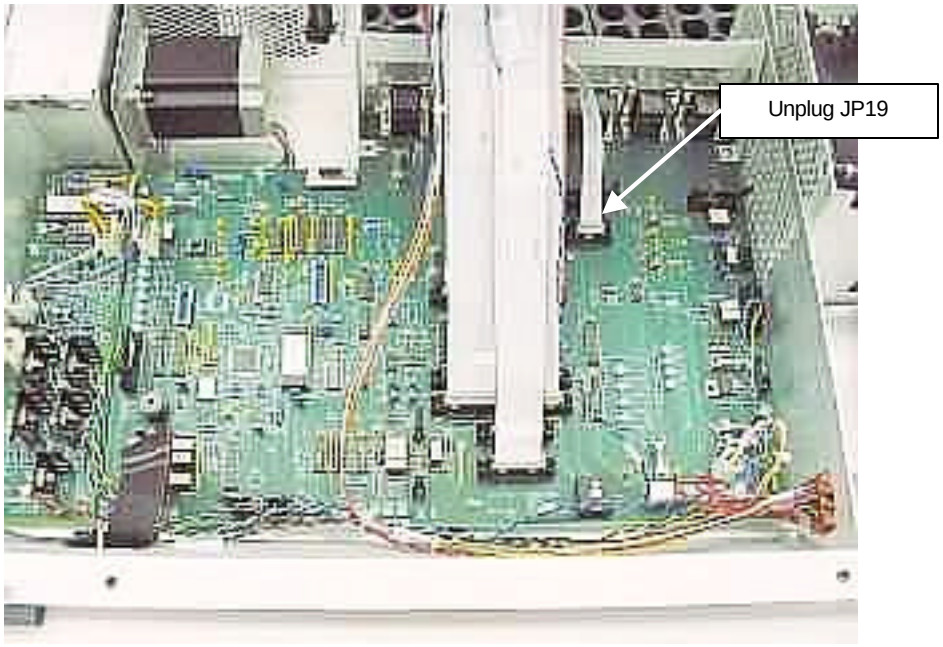


Fig. 117 - ModSig PCBA - JP19 Cable Removal

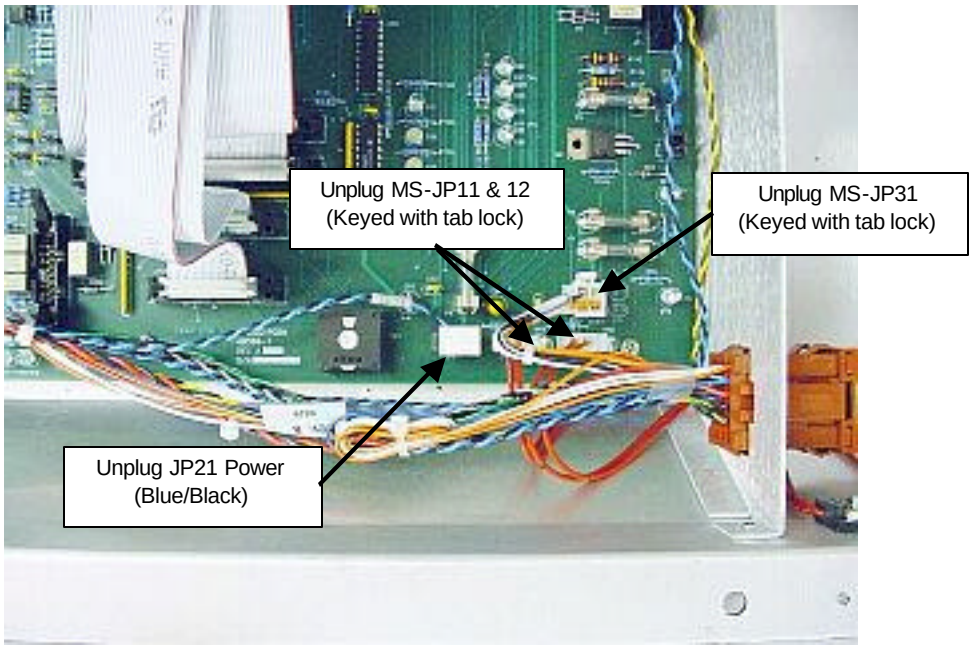


Fig. 118 - ModSig PCBA - JP21, MS-JP11, JP12 & JP31 Cable Removal

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

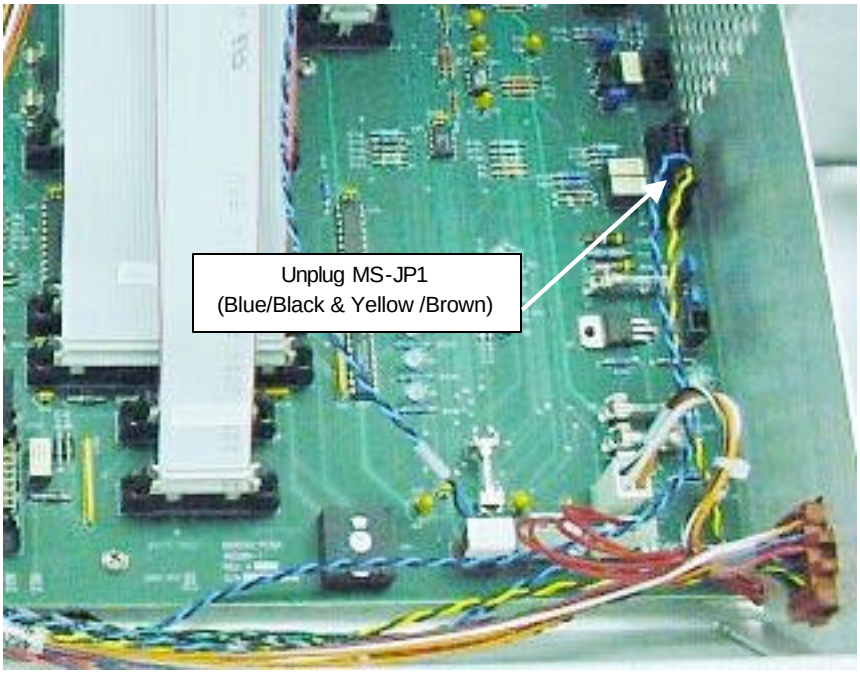


Fig. 119 - ModSig PCBA – MS-JP1 Cable Removal

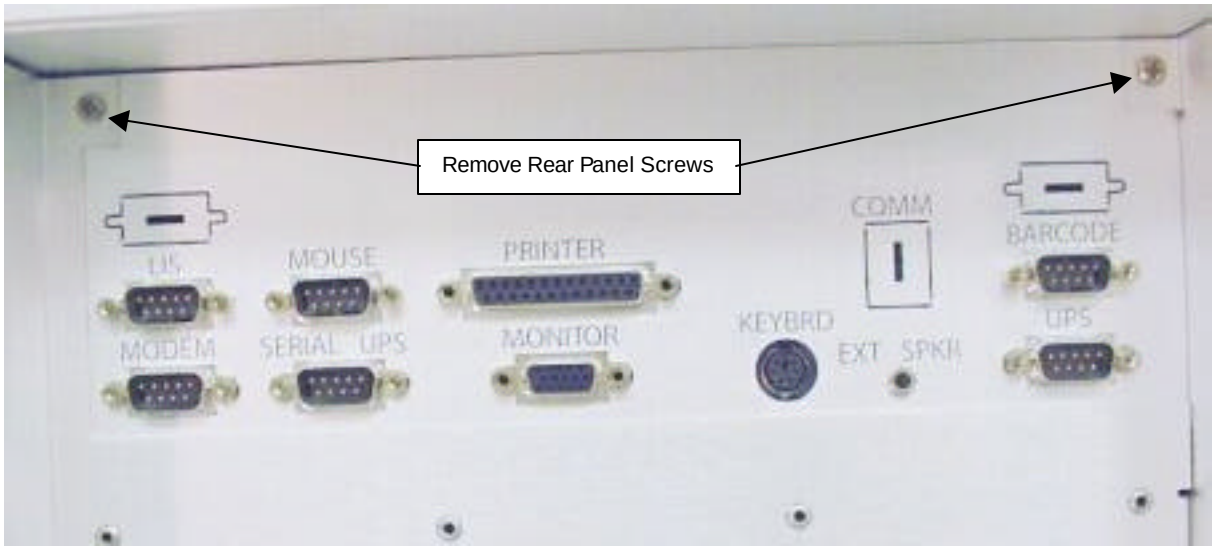


Fig. 120 - ModSig - Rear Panel Screw Removal

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

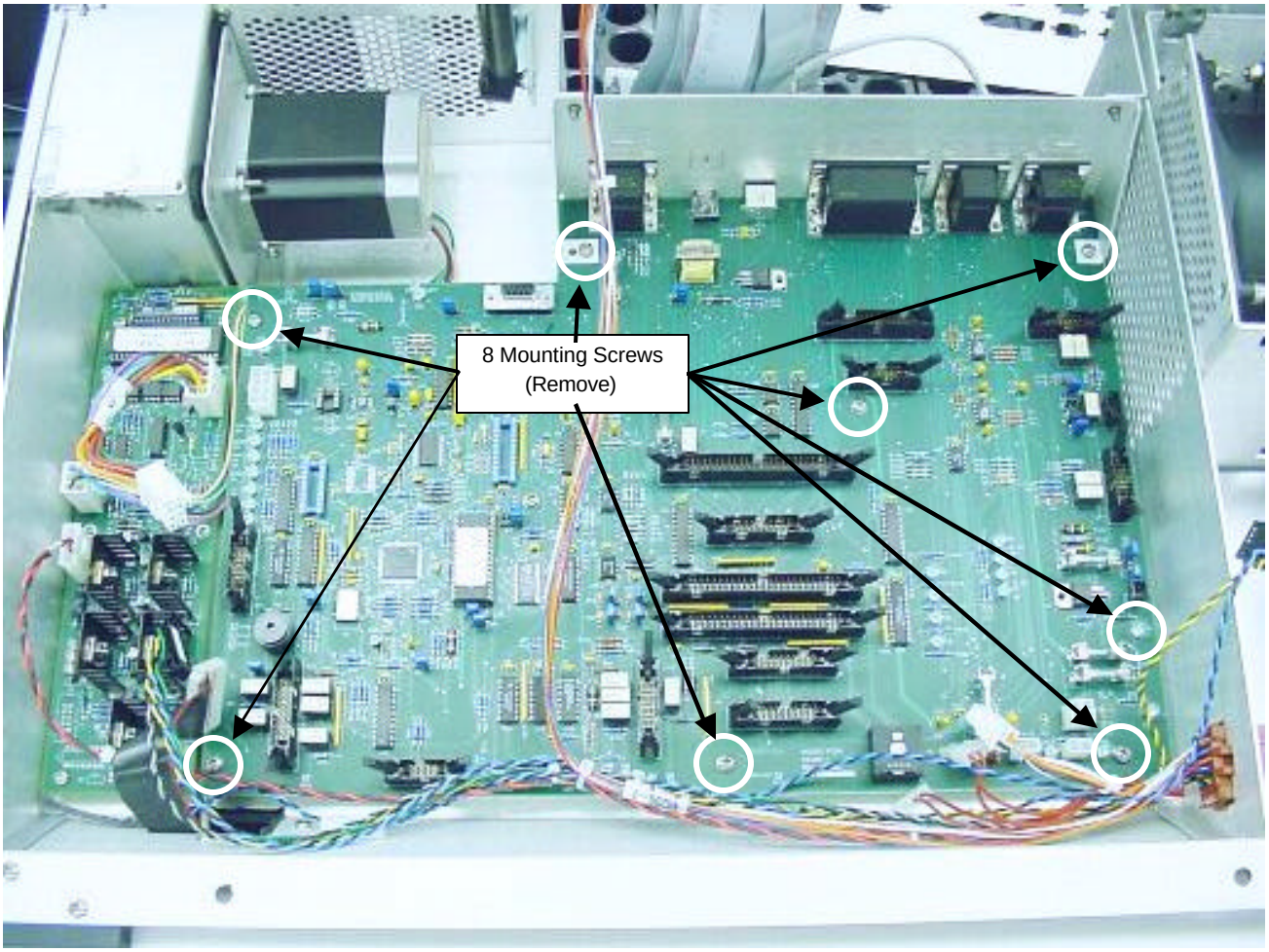


Fig. 121 - ModSig PCBA - Mounting Screw Locations

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

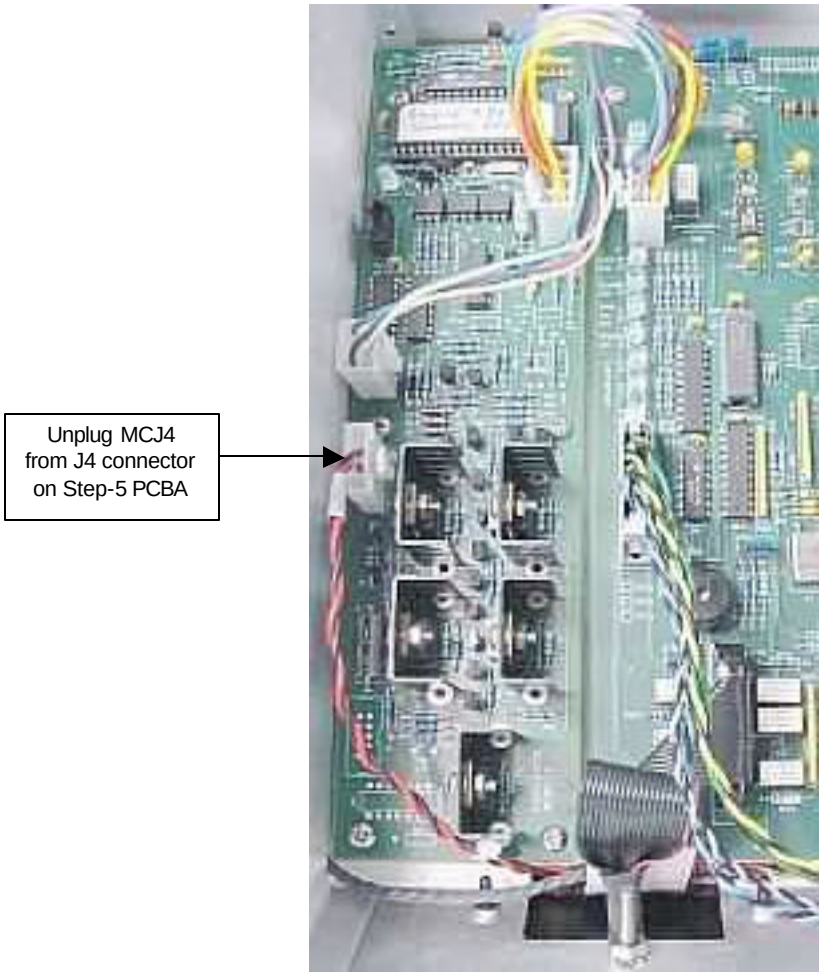


Fig. 122 - ModSig - Step5 MCJ4 Connection

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

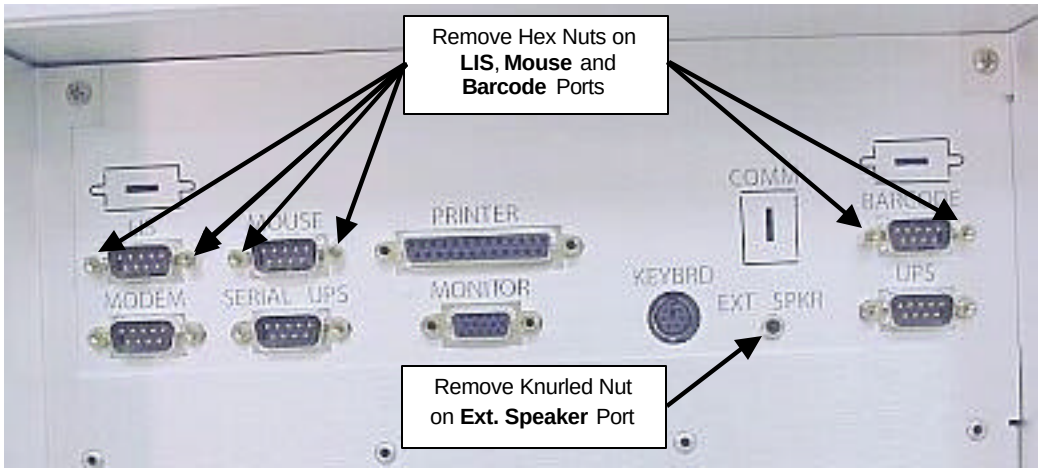


Fig. 123 - ModSig - Rear Panel Hex Nut & Knurled Nut Removal

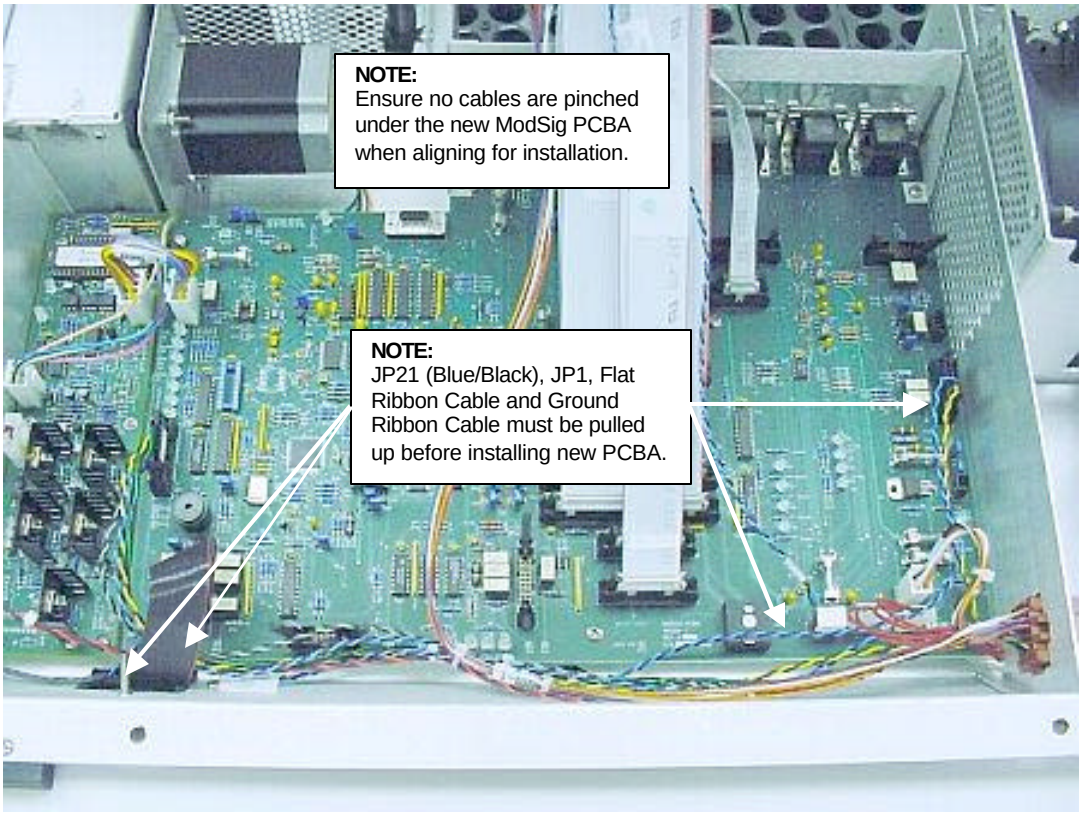


Fig. 124 - ModSig PCBA - JP10, JP1 and Ground Cable

4.10.6 ModSig PCBA (P/N 48300-1) (Continued) (Order Spare P/N 48300-901)

11. Align the Rear Bulkhead to the mounting holes and peripheral ports on the ModSig PCBA. Reinstall the two (2) screws that secure the Rear Bulkhead to the ModSig board.
12. Reinstall the two (2) each hex nuts from the left and right sides of the **LIS**, **Mouse** and **Barcode** ports on the Rear Bulkhead. (Refer to Figure 123)
13. Reinstall the knurled nut on the **Ext Speaker** port. (Refer to Figure 123)
14. Align the ModSig PCBA to the support standoffs. Ensure no cables are underneath the ModSig PCBA.
15. Loosely install the two (2) Rear Bulkhead screws to allow for proper alignment of the ModSig PCBA. Do not tighten yet. (Refer to Figure 120)
16. Loosely install all eight (8) mounting screws to assist in proper alignment. (Refer to Figure 121 for mounting screw locations.)
17. Tighten the eight (8) ModSig PCBA mounting screws.
18. Tighten the two (2) Rear Bulkhead mounting screws. (Refer to Figure 120)
19. Reconnect the cables to the PCBA according to the previous cable removal steps. Reverse Steps 2, 3 and 4. (4, 3 and 2)
20. Close the Top Panel and replace the two (2) screws that secure it. (Refer to Figure 99)
21. Close the door on the 3D 60 to allow startup of the instrument.
22. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
23. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
24. Annotate appropriate maintenance and logbooks.
25. Return the system to normal operation.

4.10.7 ModSig PCBA Fuses (P/N 870-0008-14, -17, -22)

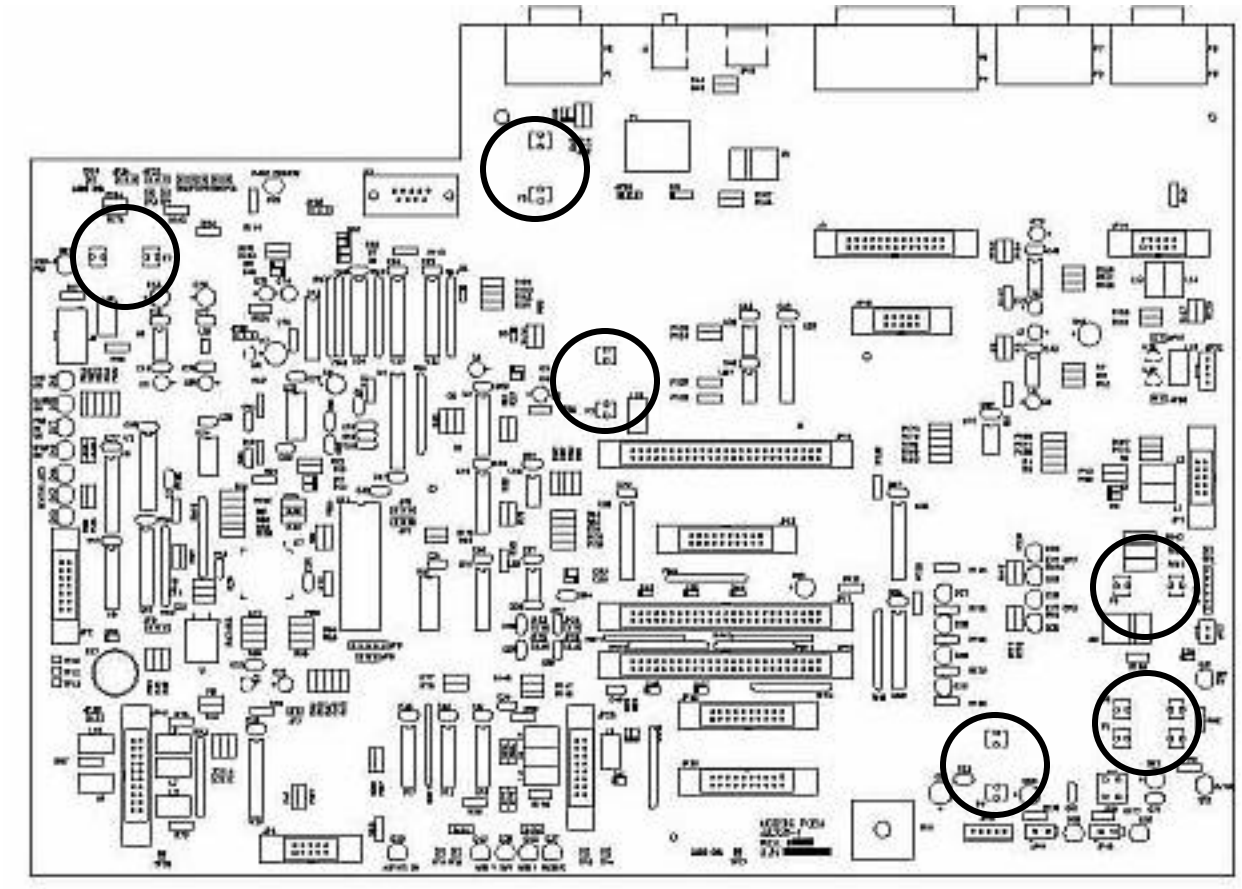


Fig. 125 - ModSig PCBA Fuse Locations

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for Top Panel screw removal locations)

4.10.7 ModSig PCBA Fuses (P/N 870-0008-14, -17, -22) (Continued)

NOTE
The ModSig PCBA (P/N 48300-1) contains seven fuses (F1-F7).
F1 & F6 are “3.15 Amp 5X20mm type FST Time Lag” (870-0008-22)
F2-F4 & F7 are “1 Amp 5X20mm type FST Time Lag” (870-0008-17)
F5 is a 0.5 Amp 5X20mm type FST Time Lag (870-0008-14)

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

CAUTION
The new fuse must be the same amperage and voltage rating as the removed fuse. Over fusing could damage the equipment and create a potential fire hazard.

3. Determine and locate which fuse is defective. (Refer to Figure 125, Figure 126 and Figure 127 for fuse locations.) Remove the defective fuse from the retaining clip and install the new fuse.

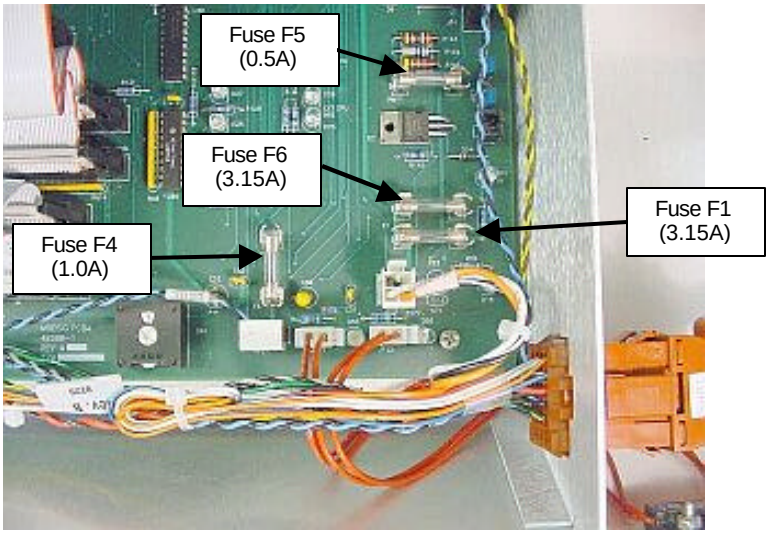


Fig. 126 - ModSig PCBA – Fuse Locations 1

4.10.7 ModSig PCBA Fuses (P/N 870-0008-14, -17, -22) (Continued)

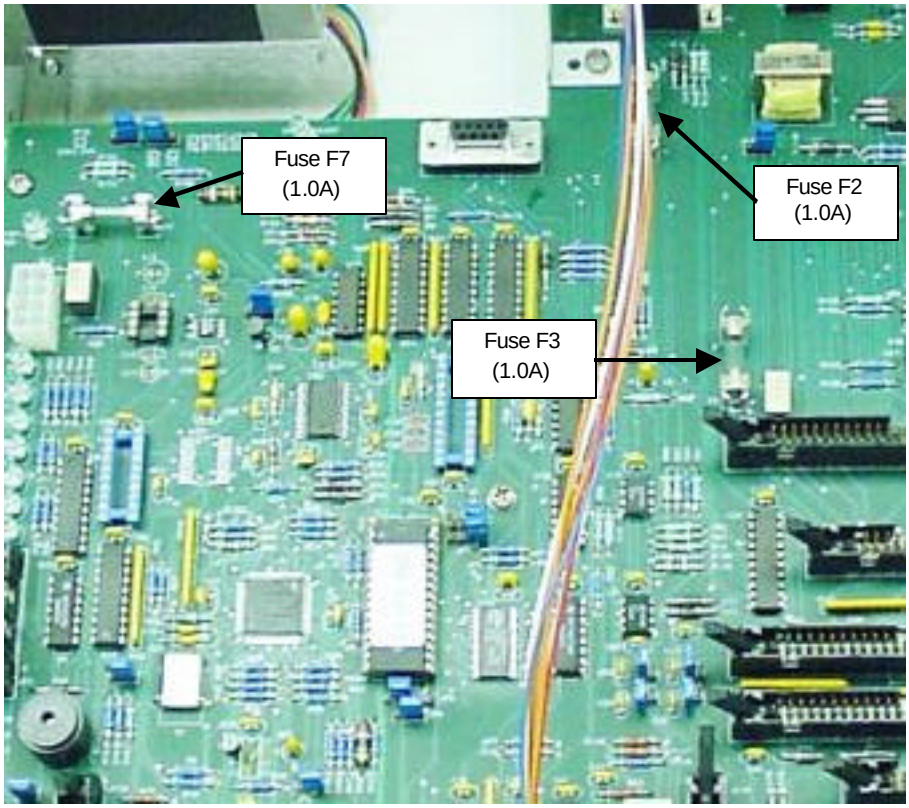


Fig. 127 - ModSig PCBA (Installed) – Fuse Locations 2

4. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
5. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
6. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
7. Annotate appropriate maintenance and logbooks.
8. Return the system to normal operation.

4.10.8 Step-5 PCBA (P/N 48301-1) (Order Spare P/N 48301-901)

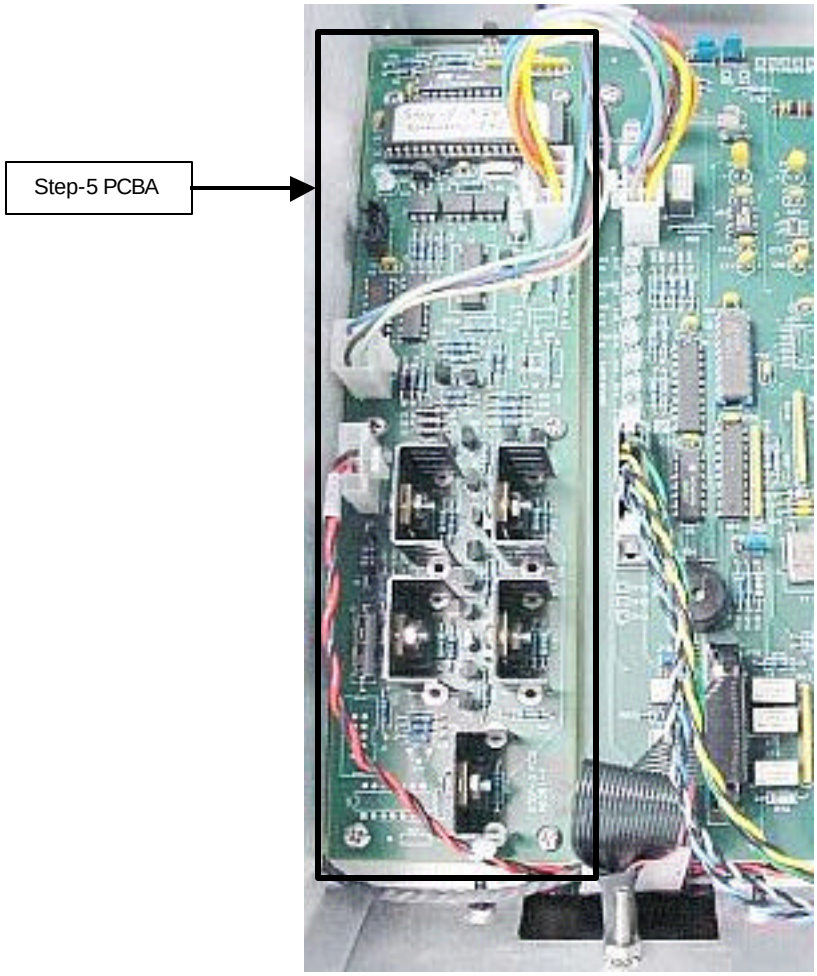


Fig. 128 - Step-5 PCBA Location

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99)

CAUTION

Proper ESD precautions must be observed whenever working on or around any PCBA.

4.10.8 Step-5 PCBA (P/N 48301-1) (Continued) (Order Spare P/N 48301-901)

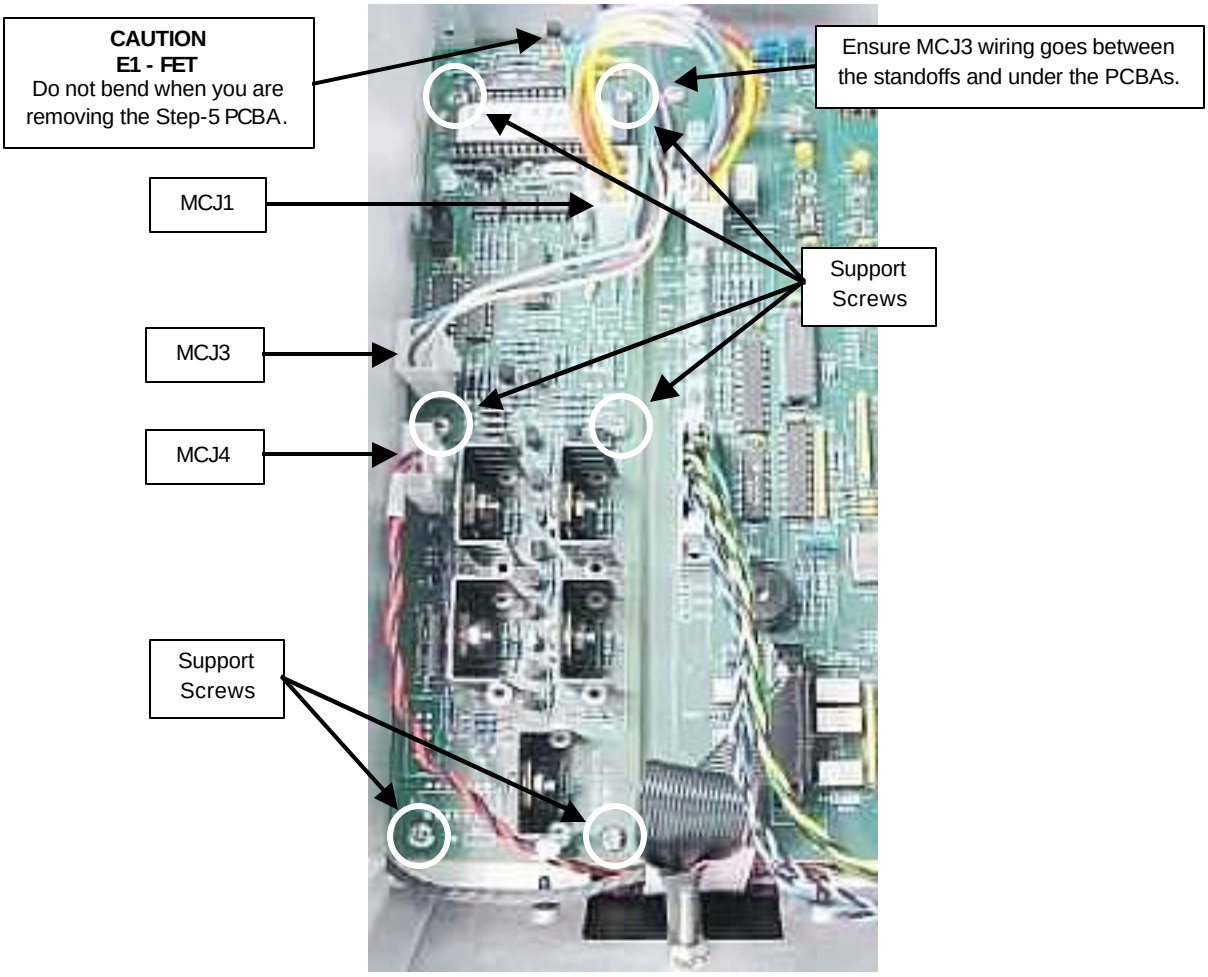


Fig. 129 - Step-5 PCBA Connector and Wiring Locations

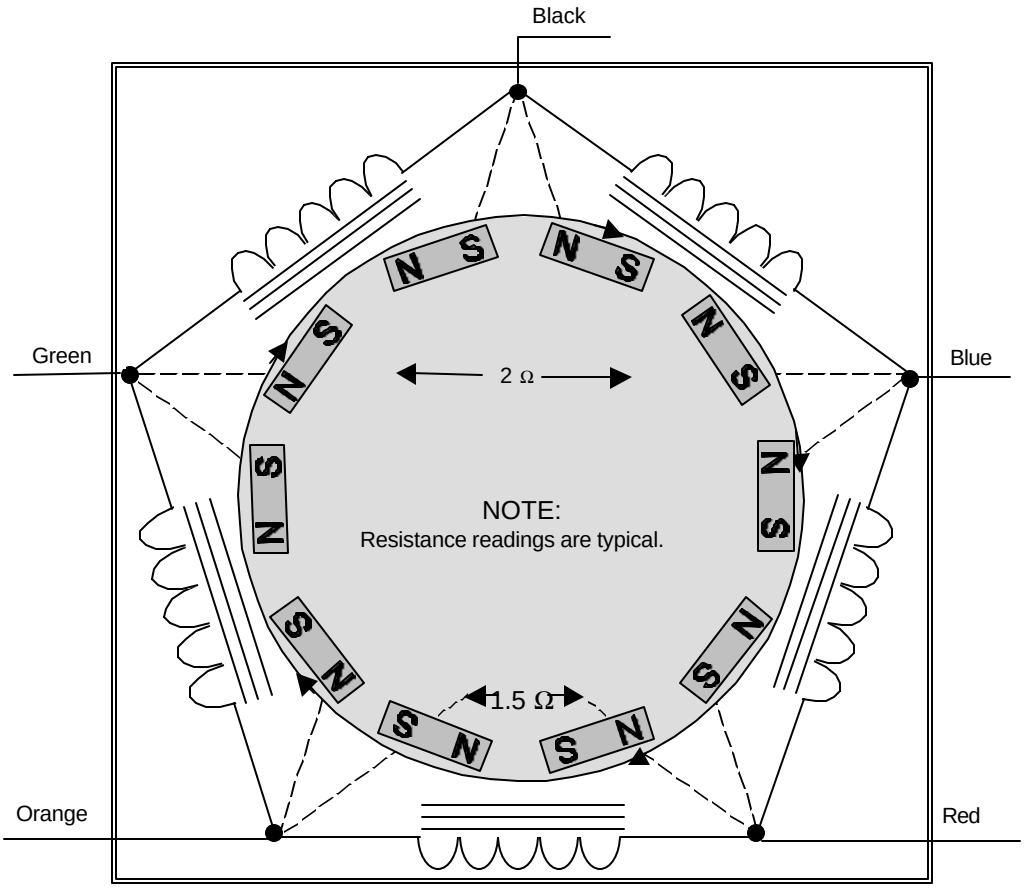
3. Unplug MCJ4 cable from J4 connector. (Refer to Figure 129 above.)
4. Unplug MCJ3 cable from J3 connector. (Refer to Figure 129 above.)
5. Unplug MCJ1 cable from J1 connector. (Refer to Figure 129 above.)
6. Remove the six (6) screws securing the Step-5 PCBA to the support standoffs. (Refer to Figure 129)
7. Align the new PCBA over the support standoffs. Plug in MCJ4 and MCJ1.

4.10.8 Step-5 PCBA (P/N 48301-1) (Continued) (Order Spare P/N 48301-901)

NOTE
Ensure motor wires (MCJ3) are routed between the inside standoffs of the ModSig and Step-5 PCBAs. Feed motor wires underneath the Step-5 PCBA and plug it in before installing the support screws.

8. Plug in MCJ3 (Motor wiring) to connector J3 and route the cables underneath the Step-5 and ModSig PCBA's. Ensure that all of the wires are routed between the inner support standoffs on both PCBA's. (Refer to Figure 129)
9. Install the support screws and check the cable and wiring routes as you reinstall them. (See NOTE above.)
10. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
11. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
12. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
13. Annotate appropriate maintenance and logbooks.
14. Return the system to normal operation.

4.10.9 Step-5 Motor (P/N 48104-1)



Pentagon Winding Configuration

	Black	Blue	Red	Orange	Green
Black	X	1.5 Ω	2 Ω	2 Ω	1.5 Ω
Blue	1.5 Ω	X	1.5 Ω	2 Ω	2 Ω
Red	2 Ω	1.5 Ω	X	1.5 Ω	2 Ω
Orange	2 Ω	2 Ω	1.5 Ω	X	1.5 Ω
Green	1.5 Ω	2 Ω	2 Ω	1.5 Ω	X

Resistance Table

NOTE: Readings may vary ± 0.2 Ω. There is no measurable conductivity between the windings and frame.

Fig. 130 - Step-5 Motor Windings

4.10.9 Step-5 Motor (P/N 48104-1) (Continued)

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99)
3. Unplug MCJ3 from connector J3. (Refer to Figure 131)

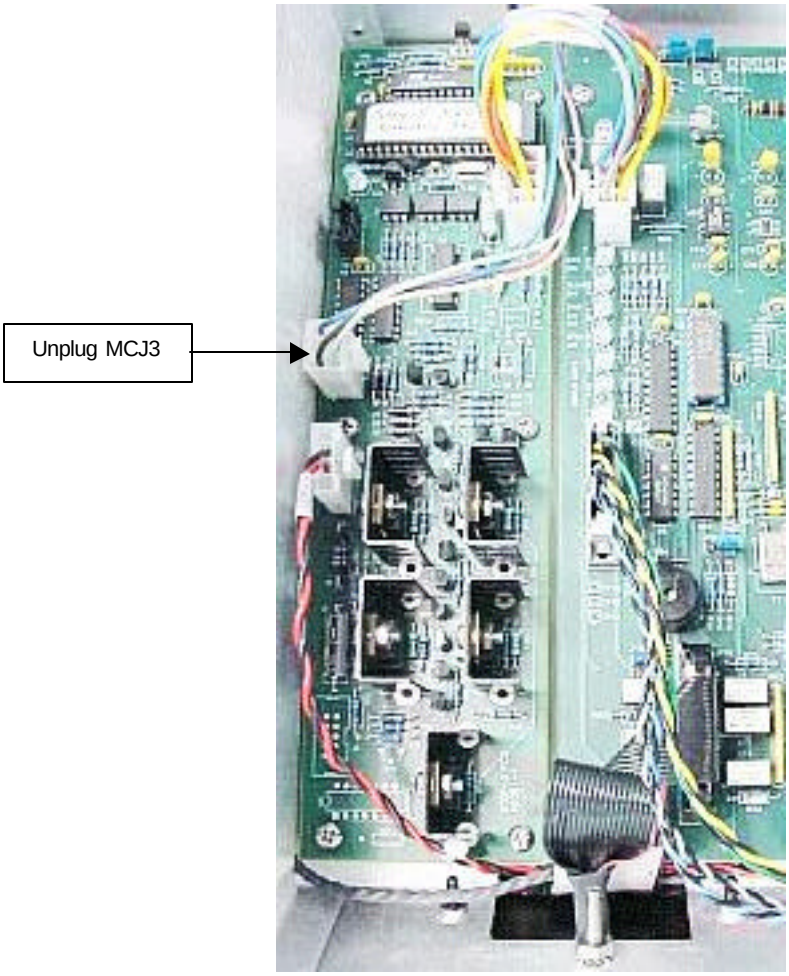


Fig. 131 - Step-5 Motor Removal – MCJ3 Disconnection

4.10.9 Step-5 Motor (P/N 48104-1) (Continued)

4. Remove the Left Side Panel by lifting from the top edge of the panel.
5. Locate the points on the Motor Offset Round and remove the two (2) set screws. Set-screws are 90° apart. (See Figure 132 below)

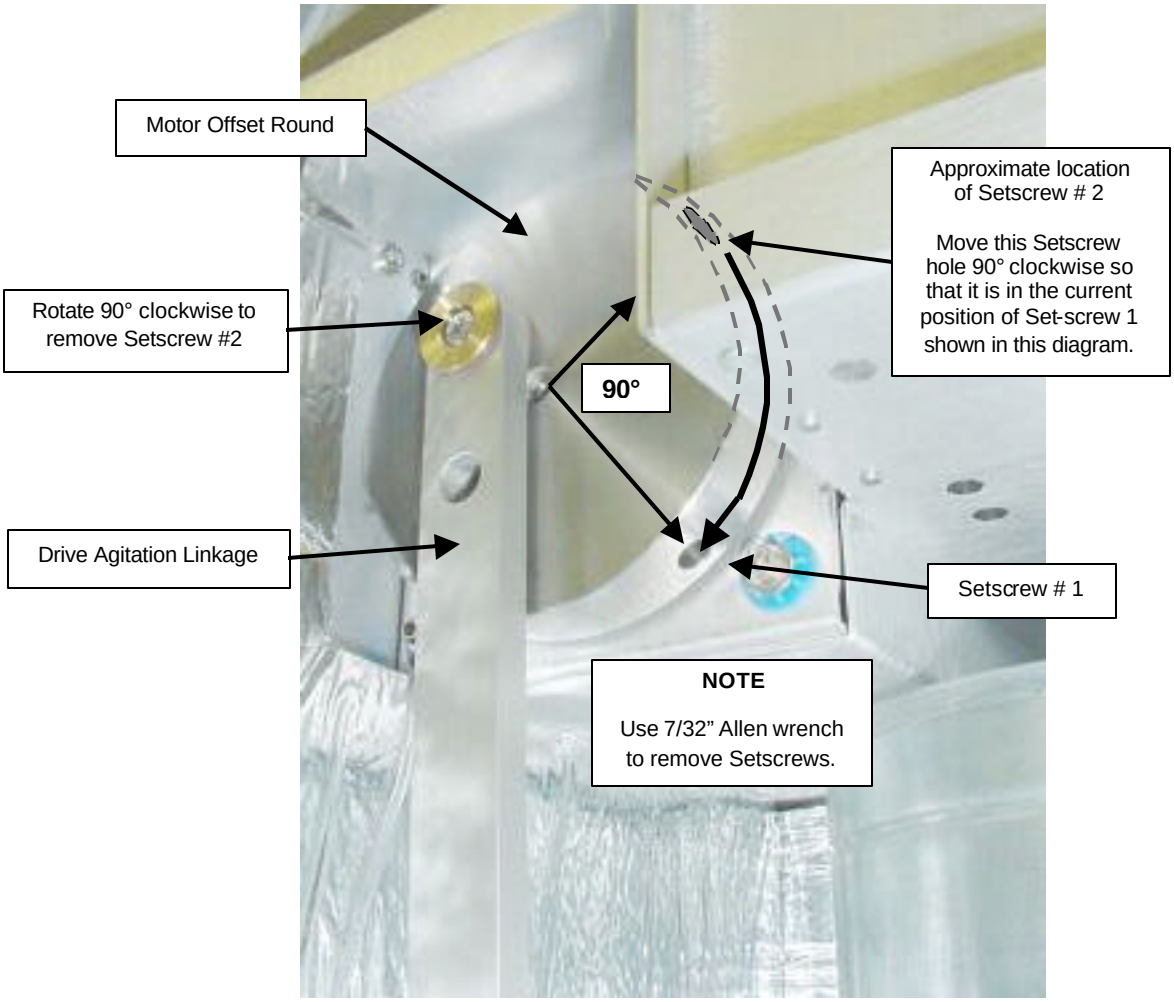


Fig. 132 - Step-5 Motor Removal – Set-Screw Removal

6. Remove the four (4) Motor Mounting Screws from the pressed nuts. (Refer to Figure 133)

4.10.9 Step-5 Motor (P/N 48104-1) (Continued)

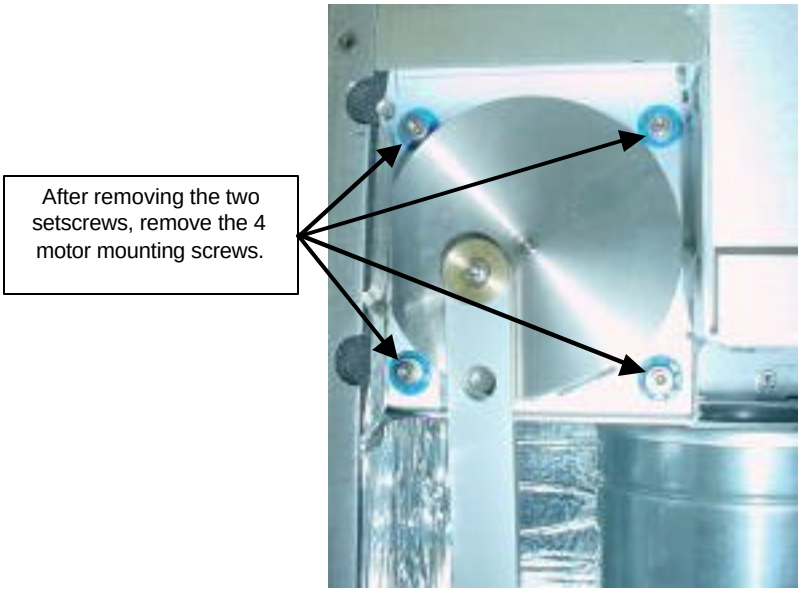


Fig. 133 - Step-5 Motor Removal – Mounting Screw Removal

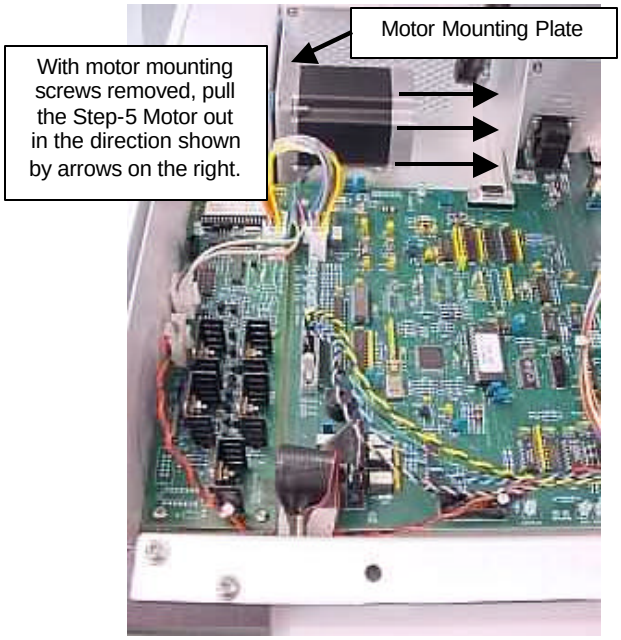


Fig. 134 - Step-5 Motor Removal

4.10.9 Step-5 Motor (P/N 48104-1) (Continued)

7. Once the motor mounting screws are removed, pull the Step-5 Motor out and to the right as shown in Figure 134.
8. Remove the motor mounting plate from the motor by removing the four (4) nuts and washers that secure it to the plate.
9. Install new Step-5 Motor on the motor mounting plate and secure the four (4) mounting nuts with washers.
10. Reinstall the motor and align it with the motor mounting screw holes.

Tighten the mounting screws in an "X" pattern starting with the upper left screw, the lower right screw next, then the upper right, and finally the lower left.

Ensure all screws have been tightened.

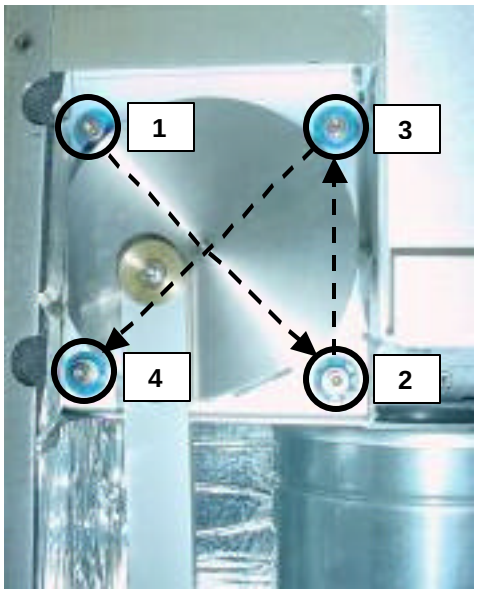


Fig. 135 - Step-5 Motor Removal – Reinstalling Mounting Screws

11. Push the four (4) motor mounting screws up to the pressed nuts and begin tightening. ***Do not tighten them all the way***. Begin tightening the mounting screws in an "X" pattern until all screws are tightened. (Refer to Figure 135 above)
12. Reinstall the Motor Offset Round with proper orientation to Motor Shaft flats. Support the opposite end of the Motor when pushing the Round on the Motor Shaft to prevent pushing the isolation grommets from their locations in the chassis holes.
13. Reinstall the two (2) Set-screws. Ensure that they are installed in the proper locations, 90° apart and that the Motor Offset Round and Drive Agitation Linkage are in the right position. (Refer to Figure 132)
14. Replace the instrument's Left Side Panel. Place a piece of heavy paper or cardstock over the foam gasket material in the front of the instrument to prevent damaging the foam when reinstalling the side panel. Ensure alignment is proper before pushing the side panel down fully into its secured position.

4.10.9 Step-5 Motor (P/N 48104-1) (Continued)

15. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
16. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
17. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
18. Annotate appropriate maintenance and logbooks.
19. Return the system to normal operation.

4.10.10 Outlet Thermistor PCBA (P/N 32300-1)

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

3. Remove the instrument’s Left Side Panel to access the Outlet Thermistor PCBA.

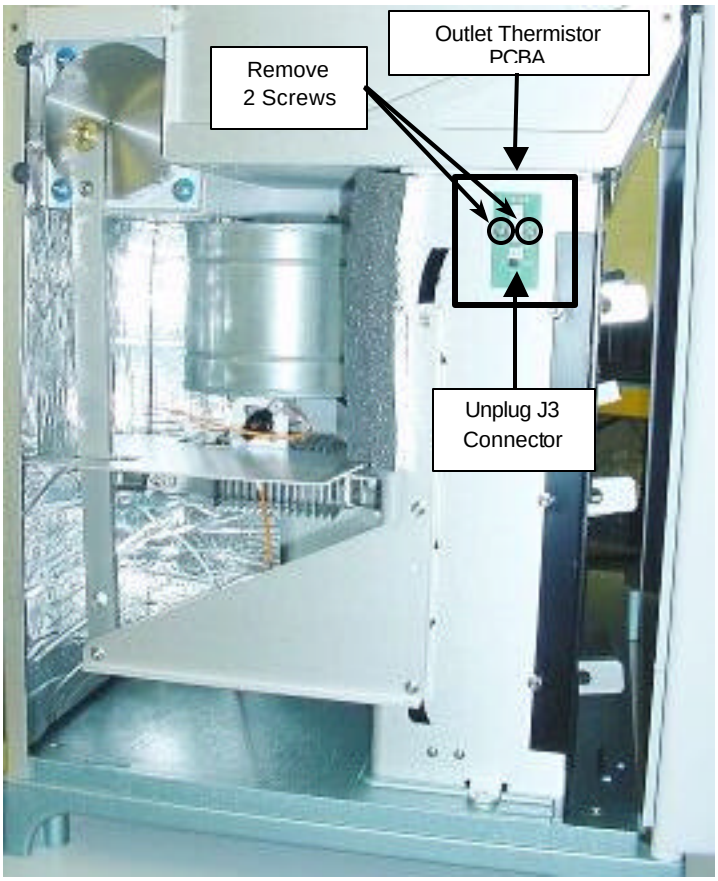


Fig. 136 - Outlet Thermistor PCBA Removal

4. Unplug cable from J3 connector on the Outlet Thermistor PCBA. (Refer to Figure 136)
5. Remove the two (2) screws securing the Outlet Thermistor PCBA to the panel.
6. Install the new Outlet Thermistor PCBA and secure with two (2) mounting screws.
7. Plug J3 cable back into the Outlet Thermistor PCBA at J3.

4.10.10 Outlet Thermistor PCBA (P/N 32300-1) (Continued)

8. Reinstall the Left Side Panel. To protect the foam door seal from damage, place a piece of thick paper or cardstock over the wide foam at the top of the door. Remove the paper cardstock after completing the Left Side Panel installation.
9. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
10. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
11. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
12. Annotate appropriate maintenance and logbooks.
13. Return the system to normal operation.

4.10.11 Inlet Thermistor PCBA (P/N 32300-1)

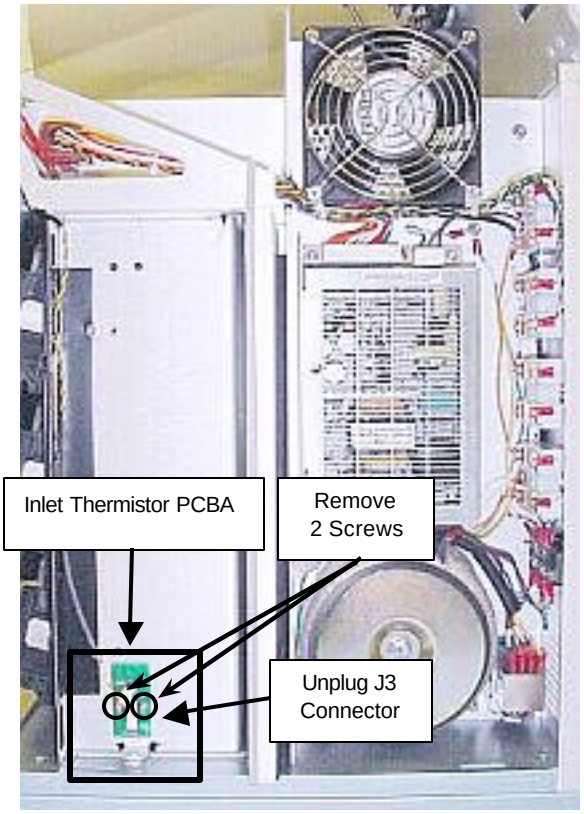


Fig. 137 - Inlet Thermistor PCBA Removal

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)
3. Remove the instrument’s Right Side Panel to access the Inlet Thermistor PCBA.
4. Unplug cable from J3 connector on the Inlet Thermistor PCBA. (Refer to Figure 137)
5. Remove the two (2) screws securing the Inlet Thermistor PCBA to the panel.
6. Install the new Inlet Thermistor PCBA and secure with the two (2) mounting screws.
7. Plug J3 cable back into the Thermistor at J3 connector.
8. To protect the foam door seal, use paper cardstock over the wide foam at the top of the door. Reinstall the Right Side Panel of the instrument. Remove the paper cardstock after completing the Right Side Panel installation.
9. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
10. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
11. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
12. Annotate appropriate maintenance and logbooks.
13. Return the system to normal operation.

4.10.12 Zip™ Drive (P/N 895-0004-38)

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

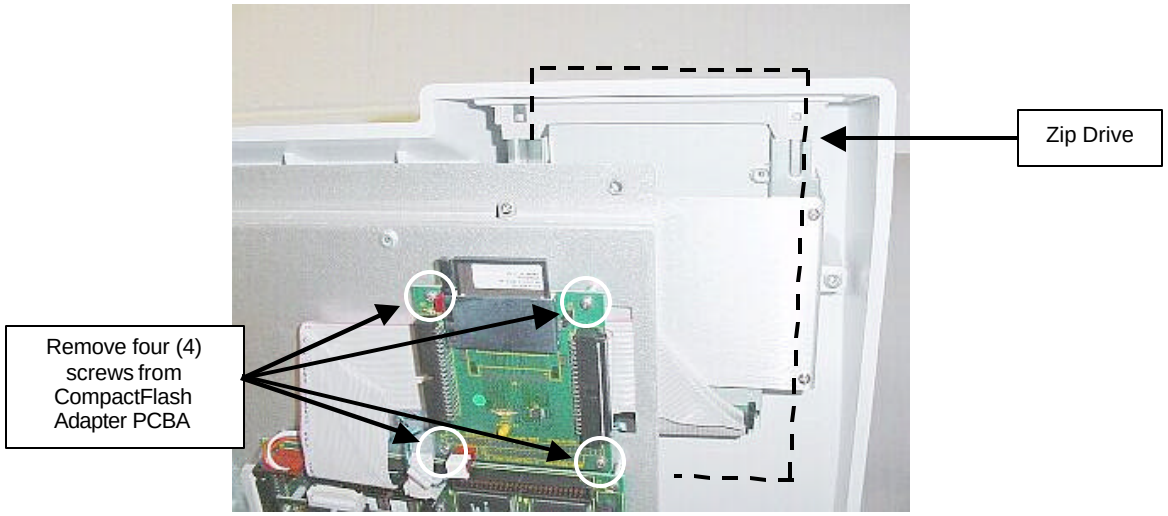


Fig. 138 - Zip™ Drive Removal

3. Remove the four (4) screws securing the CompactFlash Adapter PCBA to chassis. (Refer to Figure 138)
4. Let the Flash Adapter hang down as shown in Figure 139.

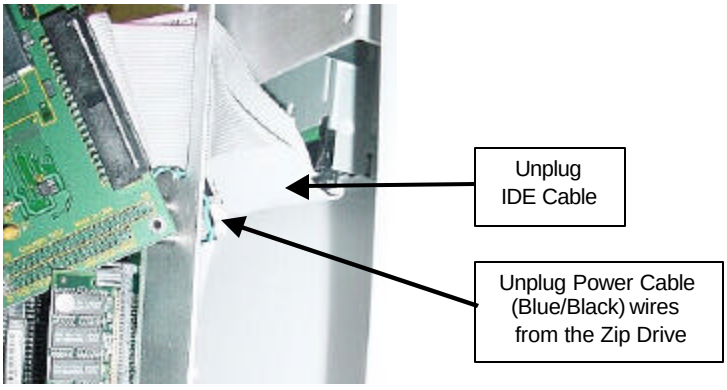


Fig. 139 - Zip Drive - Flash Adapter PCBA Removal

4.10.12 Zip™ Drive (P/N 895-0004-38) (Continued)

5. Unplug the IDE cable from the Zip drive. (Refer to Figure 139)
6. Unplug the Zip drive's main power connector (Blue/Black wires) Do not pull on the wires to unplug the connector. Unplug power connector by pulling on the connector itself. (Refer to Figure 139)
7. Remove the four (4) screws securing the zip drive to the instrument. Hold on to the Zip drive as you remove the last mounting screw. (Refer to Figure 140)

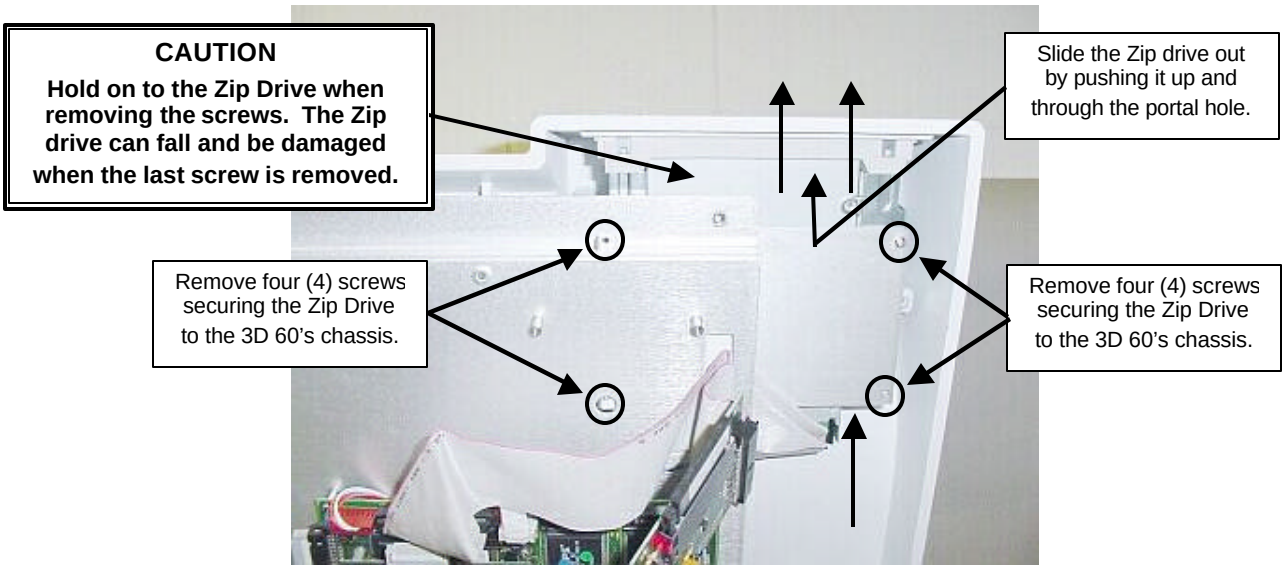


Fig. 140 - Zip Drive Screw Removal

8. Lower the Top Panel about half way. From the bottom of the Zip drive, push the drive through the cutout hole as shown in Figure 141.

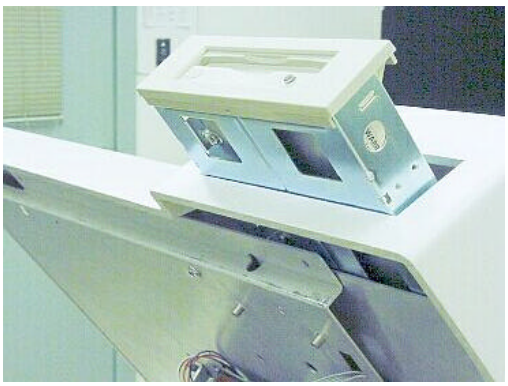


Fig. 141 - Zip Drive Removal – Cutout Hole

4.10.12 Zip™ Drive (P/N 895-0004-38) (Continued)

9. Set the drive down on a clean work surface. Remove the drive from the mounting sled. Typically, four (4) to six (6) screws secure the Zip Drive to the sled. The mounting screws may be installed from the side (Refer to Figure 142) or bottom (Refer to Figure 143) of the Zip drive…depending on how the vendor assembles and ships the drive assembly to bioMérieux manufacturing.

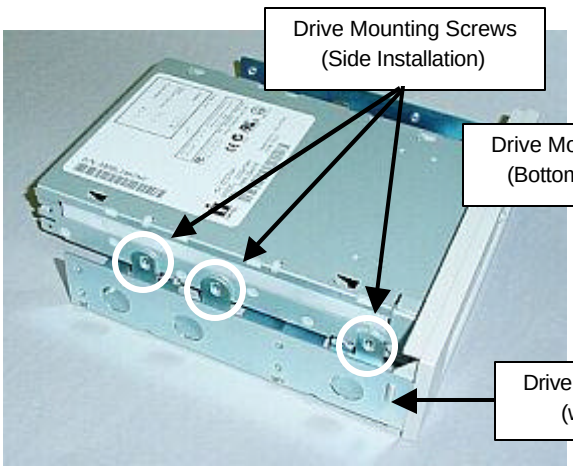


Fig. 142 - Zip Drive Sled Removal (Side Screws)

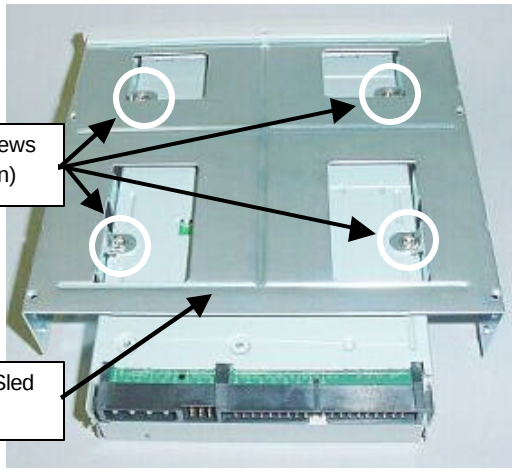


Fig. 143 - Zip Drive Sled Removal (Bottom Screws)

10. Install the new Zip drive into the mounting sled with mounting screws as shown above.
11. Lower the Top Panel about half way. From the bezel of the Zip drive, push the drive through the cutout hole as shown in Figure 141.
12. Reinstall the four (4) screws securing the zip drive to the chassis. Hold on to the Zip drive until you install at least one mounting screw. (Refer to Figure 141)
13. Plug in the Zip drive's main power connector (Blue/Black wires) (Refer to Figure 144).
14. Plug in the IDE cable. (Refer to Figure 144)

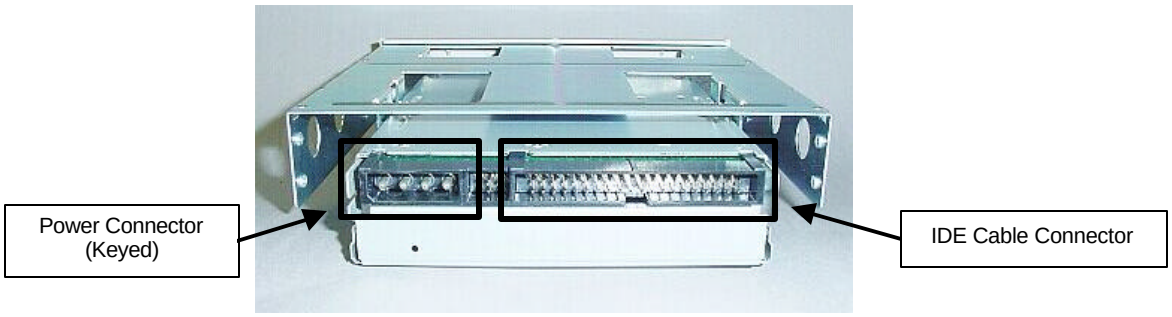


Fig. 144 - Zip Drive - Reconnecting IDE Cable and Power Connector

4.10.12 Zip™ Drive (P/N 895-0004-38) (Continued)

15. Reinstall the four (4) screws that secure the CaompactFlash Adapter PCBA to the chassis. (Refer to Figure 138)
16. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
17. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
18. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
19. Annotate appropriate maintenance and logbooks.
20. Return the system to normal operation.

4.10.13 System Power Panel

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal location.)
3. Remove the instrument’s Right Side Panel to access the Power Panel Assembly.

CAUTION

Proper ESD precautions must be observed whenever working on or around any PCBA.

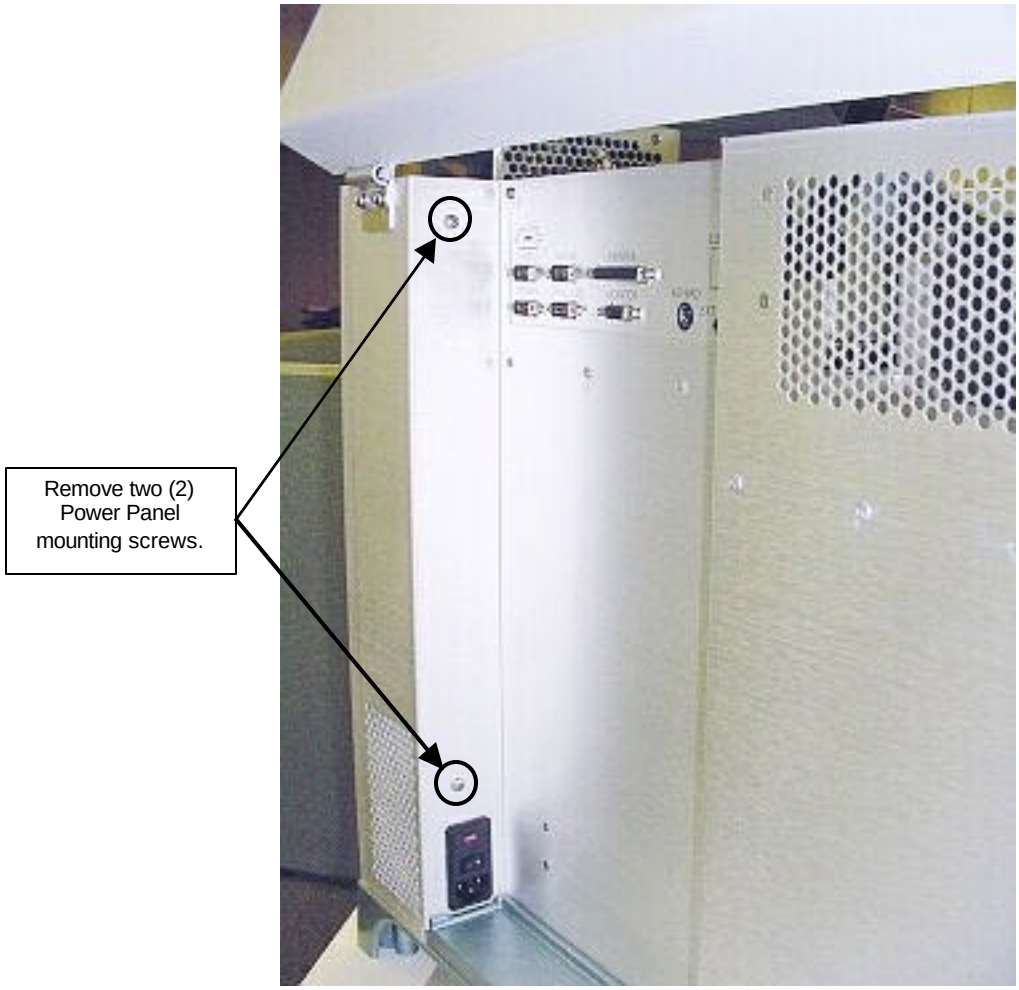


Fig. 145 - Power Panel Assembly - Screw Removal

4.10.13 System Power Panel (Continued)

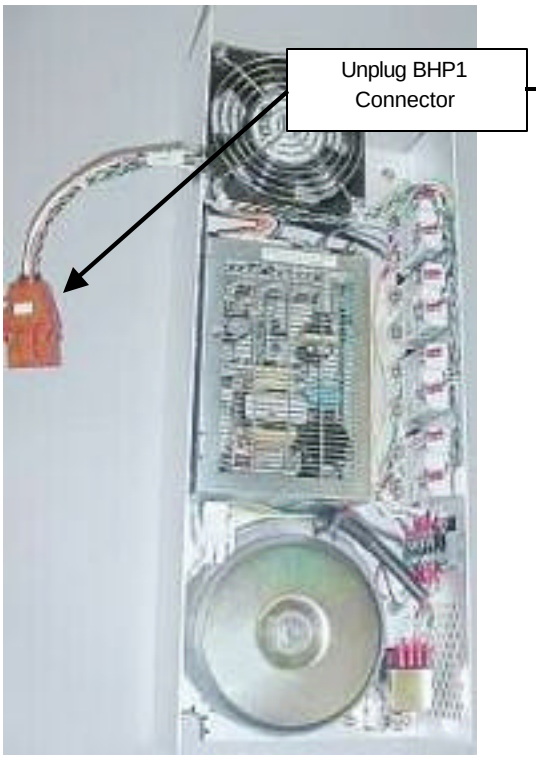


Fig. 146 - Power Panel Assembly

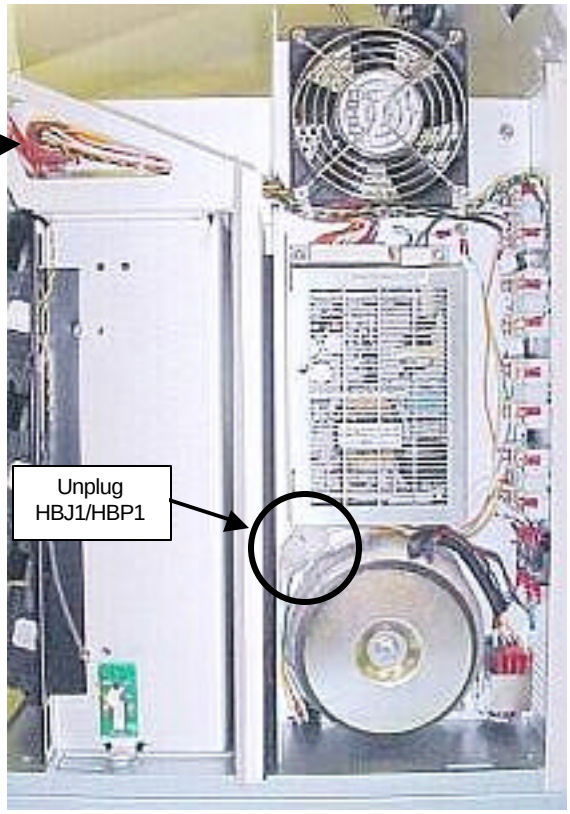


Fig. 147 - Power Panel Assembly - Installed

4. Unplug HBJ1/HBP1 wiring connector coming from the Heater and Blower to TB1 and Relays. (Refer to Figure 147)
5. Unplug BHP1 wiring connector coming from the Electronics Compartment to the Power Supply. (Refer to Figure 146 and Figure 147)
6. Remove the two (2) screws from the system chassis (in the rear of the instrument as shown), in order to remove the Power Panel Assembly. (Refer to Figure 145)
7. Lift the defective Power Supply Assembly up and out of the 3D 60 instrument. You may have to push the Top Panel beyond the normal locked position of the Gas Spring Assembly in order to clear the Power Supply Panel from the 3D 60 instrument.
8. Reverse the previous steps to install the new Power Supply Assembly.
9. Ensure that all wiring connectors are reconnected prior to power up.
10. Close the System Top Panel and secure it with two (2) screws.
11. Use cardstock to protect the door seal when installing. Reinstall Right Side Panel.
12. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
13. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
14. Annotate appropriate maintenance and logbooks.
15. Return the system to normal operation.

4.10.14 Power Supply Transformer (P/N 851-0015-01)

NOTE
Individual power supply subassembly components are not repaired or replaced in Domestic 3D 60's. Individual components are spared as parts and replaced in International 3D 60 instruments only.

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the "Up" position. (Refer to Figure 99 for screw removal locations)
3. Remove the instrument's Right Side Panel to access the Power Panel Assembly.
4. Remove the Power Panel Assembly from the 3D 60 instrument as shown in the removal steps in the previous section. (Refer to Section 4.10.13 - System Power Panel removal.)

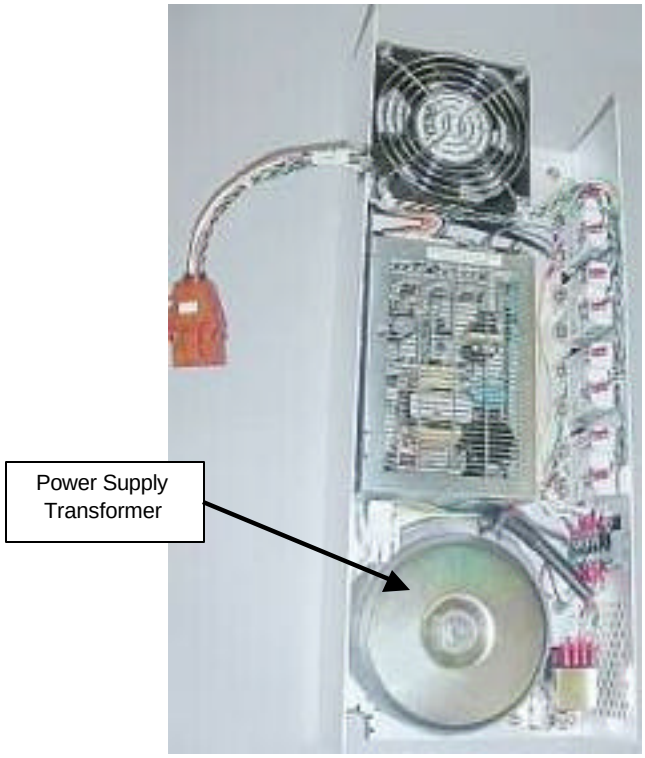


Fig. 148 - Power Supply Transformer – Power Supply Panel Removed

4.10.14 Power Supply Transformer (P/N 851-0015-01) (Continued)

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

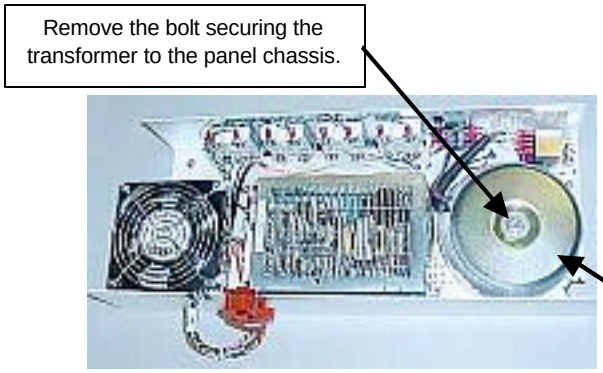


Fig. 149 - Power Panel with Transformer Installed

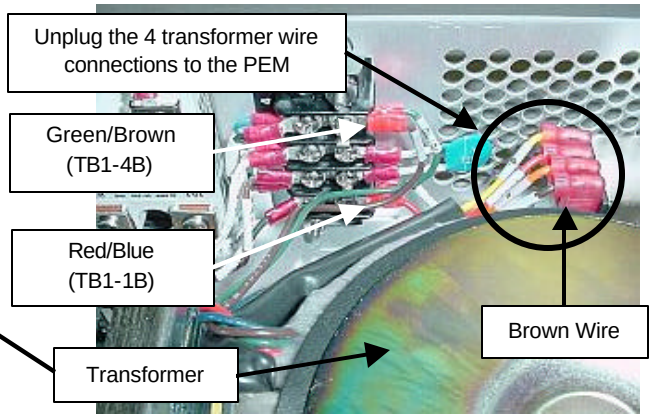


Fig. 150 - Transformer – PEM Connections

5. Unplug the four (4) Transformer wires that plug into the PEM. (Brown/PWRSWA, Orange/PWRSWB, Red/PWRSWC and Yellow/PWRSWD) (Refer to Figure 150)
6. Remove the screw securing the transformer to the Power Panel Assembly chassis. (Refer to Figure 149)
7. Remove the screws from Terminal Block TB1-1B and TB1-4B. Disconnect the Green/Brown wires from TB1-4B and the Red/Blue wires from TB1-1B. (Refer to Figure 150)
8. Reverse Steps 6 and 7 to mount the new transformer back onto the unit's chassis and reinstall the (Red/Blue) wires onto terminal TB1-1B and the (Green/Brown) wires onto the terminal TB1-4B. (Refer to Figure 150)
9. Ensure all four (4) of transformer wires are reconnected to the PEM; from left to right, looking from the rear of the instrument (Refer to Figure 150), Brown, Orange, Red and Yellow.
10. Reverse the steps in the previous section to install the Power Panel Assembly back into the 3D 60 instrument. (Refer to Section 4.10.13 – System Power Panel)
11. Reinstall the Right Side Panel of the instrument. Place a piece of cardstock over the foam gasket material in the front of the instrument to prevent damage to the foam when reinstalling the Right Side Panel.
12. Close the Top Panel and install the two (2) screws that secure it. (Refer to Figure 99)
13. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
14. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
15. Annotate the appropriate maintenance and lab logbooks.
16. Return the system to normal operation.

4.10.15 Power Supply MOV - Metal Oxide Varistor (P/N 43116-2)

NOTE
Individual power supply subassembly components are not repaired or replaced in Domestic 3D 60's. Individual components are spared as parts and replaced in International 3D 60 instruments only.

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the "Up" position. (Refer to Figure 99 for screw removal locations)

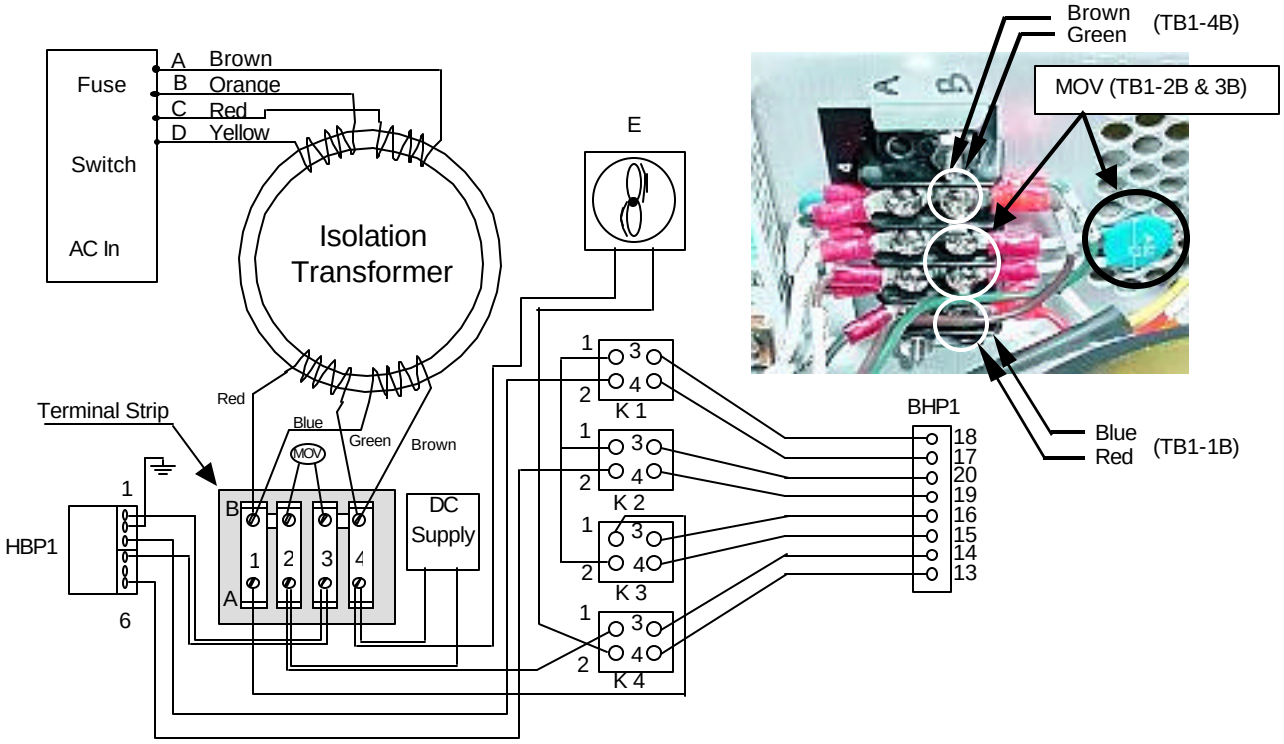


Fig. 151 - Power Supply – Simplified Schematic

Fig. 152 - Term Board 1 (TB1)

3. Remove the instrument's Right Side Panel to access the Power Panel Assembly.
4. Remove the bolt that secures the Transformer to the Power Supply Assembly chassis. (Refer to Figure 149)
5. Pull the transformer out of the instrument far enough to easily access the Terminal Board (TB1). Disconnection of Transformer wires is not necessary.

4.10.15 Power Supply MOV - Metal Oxide Varistor (P/N 43116-2) (Continued)

6. With a short Phillips screwdriver, remove the screws from TB1-2B and TB1-3B terminals and remove the MOV.
7. Install the new MOV and secure the terminal screws and wires back on to TB1-2B and TB1-3B. (Refer to Figure 151 and Figure 152)
8. Align the Transformer back on the chassis and secure it with its mounting bolt. (Refer to Figure 149)
9. Reinstall the Right Side Panel of the 3D 60 instrument.
10. Close the Top Panel and install the two (2) screws that secure it. (Refer to Figure 99)
11. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
12. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
13. Annotate the appropriate maintenance and lab logbooks.
14. Return the system to normal operation.

4.10.16 Power Panel Solid State Relays (P/N 845-0018-01)

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)

CAUTION

Proper ESD precautions must be observed whenever working on or around any PCBA.

NOTE

Individual power supply subassembly components are not repaired or replaced in Domestic 3D 60’s. Individual components are spared as parts and replaced in International 3D 60 instruments only.

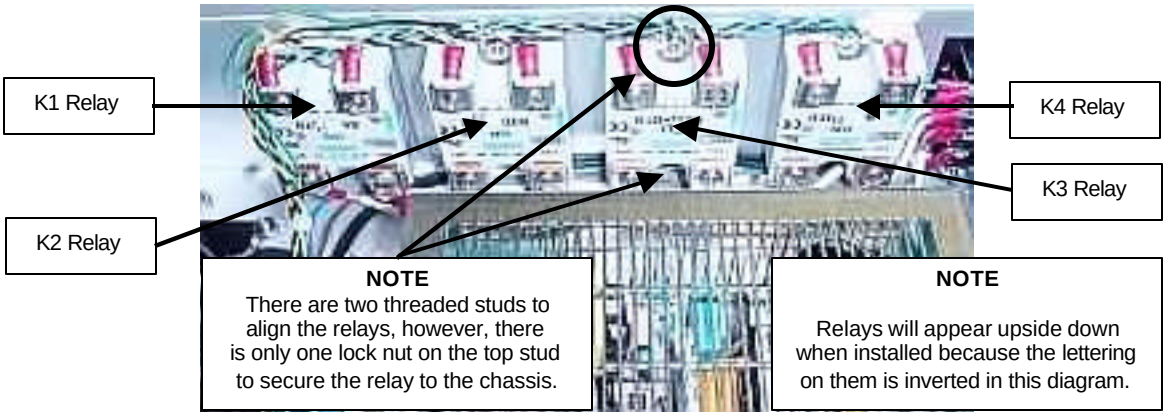


Fig. 153 - Power Panel Solid State Relay Layout

3. Remove the instrument’s Right Side Panel to access the Power Panel Assembly.
4. Remove the lock nut from the defective relay. (Refer to NOTE in Figure 153)
5. Gently pull the relay out and off of the studs taking care not to damage the wires attached to the terminals.
6. One-by-one, remove the wires from each terminal on the defective relay by removing the screw. Write down, tape or diagram the wire IDs and colors and what terminals they are installed on. As you remove and reinstall the wiring, ensure that the terminal ID markings and orientation of the relays (new and defective) are the same. (Refer to Figure 150 in previous Subsection 4.10.15 for relay wiring diagram.)
7. Once all wires are installed on the new relay, secure the relay to the chassis by aligning the holes in the relay to the threaded studs. Secure the relay with the lock washer on the top stud.

4.10.16 Power Panel Solid State Relays (P/N 845-0018-01) (Continued)

8. Reinstall the Right Side Panel of the instrument.
9. Close the Top Panel and install the two (2) screws that secure it. (Refer to Figure 99)
10. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
11. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
12. Annotate the appropriate maintenance and lab logbooks.
13. Return the system to normal operation.

4.10.17 DC Power Supply (P/N 852-0010-01)

NOTE
Individual power supply subassembly components are not repaired or replaced in Domestic 3D 60's. Individual components are spared as parts and replaced in International 3D 60 instruments only.

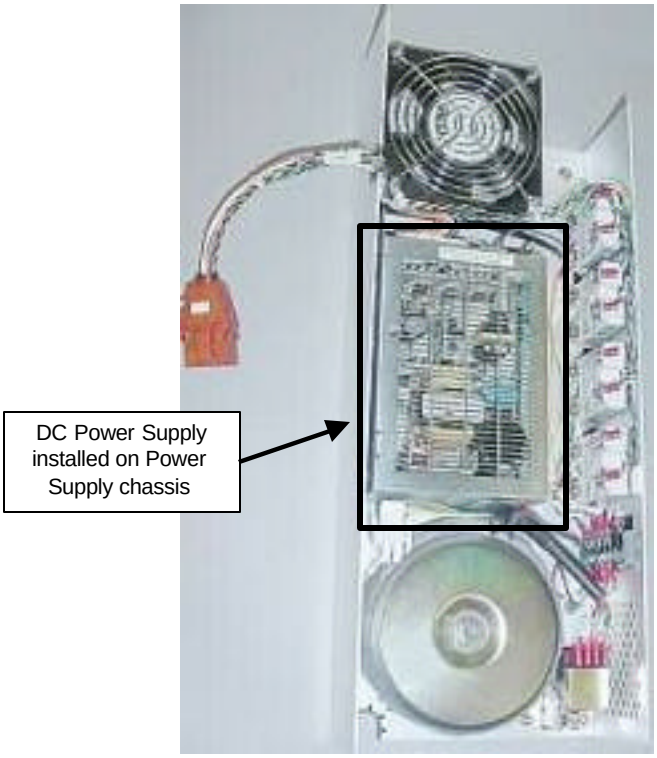


Fig. 154 - Power Supply Assembly w/DC Power Supply

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the "Up" position. (Refer to Figure 99 for screw removal locations)

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

4.10.17 DC Power Supply (P/N 852-0010-01) (Continued)

3. Remove 3D 60 Instrument's Right Side Panel and set the panel aside.
4. Remove the Power Supply Panel from the 3D 60 instrument. (Refer to Section 4.10.13 for System Power Panel removal)

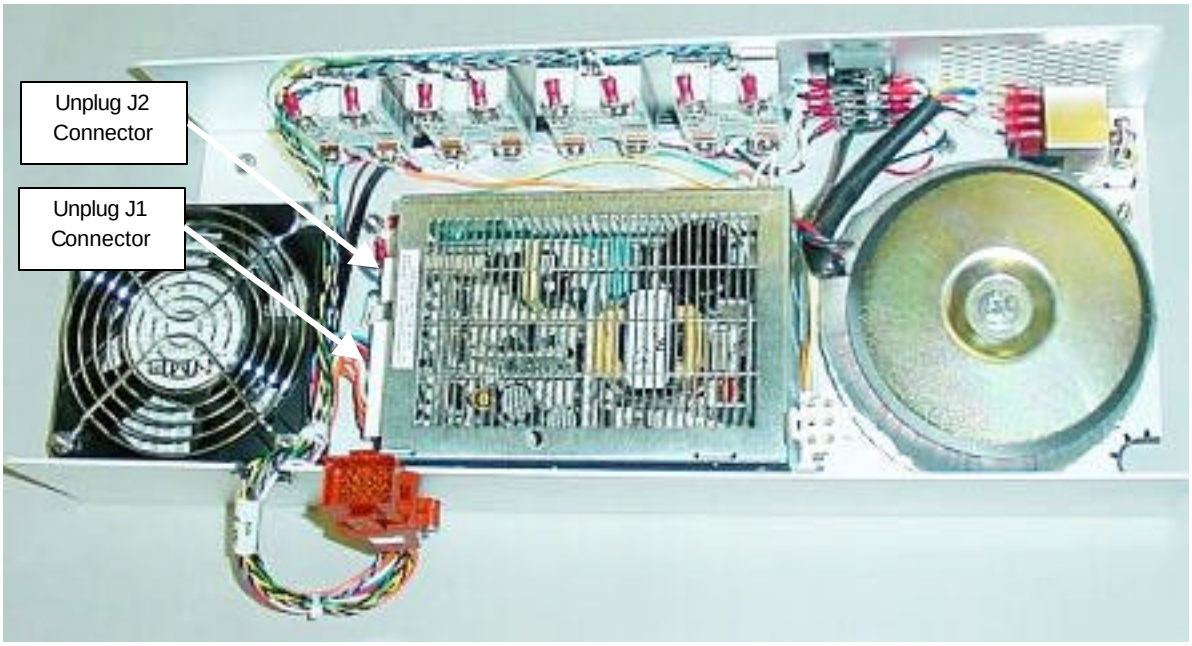


Fig. 155 - DC Power Supply – J1 and J2 Disconnection

5. Disconnect J1 and J2 connectors from the DC Power Supply's PCBA (Refer to Figure 155)
6. Remove four (4) mounting screws from the rear of the Power Panel Assembly. Ensure that you hold on to the DC supply as you remove the final mounting screw. Set the defective Power Supply aside. (Refer to Figure 156)

4.10.17 DC Power Supply (P/N 852-0010-01) (Continued)

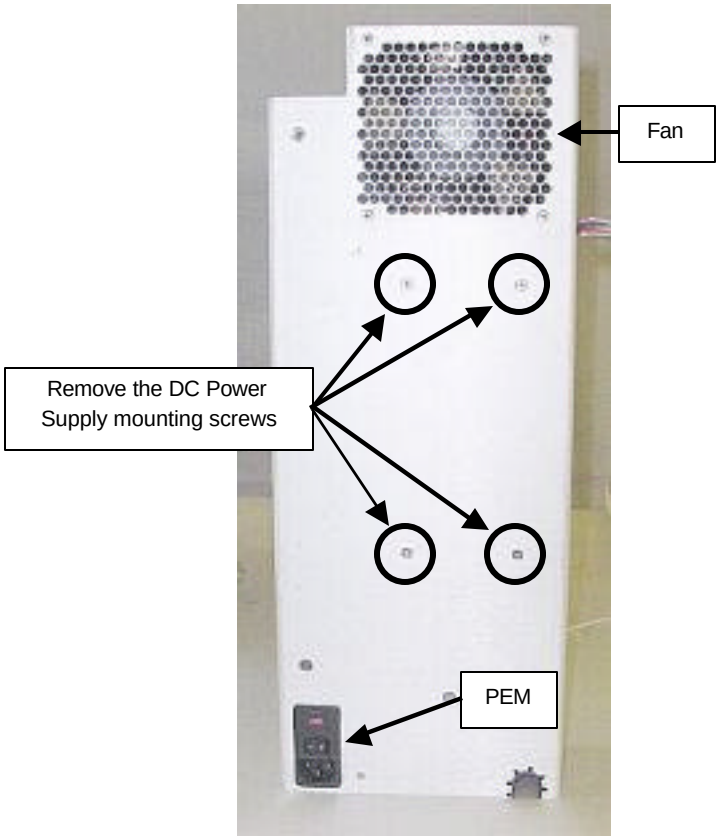


Fig. 156 - Power Panel Assembly – DC Supply Screw Removal

7. Align the new DC Power Supply to the mounting holes and reinstall the four (4) screws. (Refer to Figure 156 for mounting screw locations)
8. Reconnect J1 and J2 connectors to the power supply. (Refer to Figure 155)
9. Reverse the steps to reinstall the System Power Panel back into the 3D 60 chassis. Ensure all wiring connections are made. (Refer to Section 4.10.13 for System Power Panel Removal and Installation)
10. Reinstall the Right Side Panel on the 3D 60 instrument.
11. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
12. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
13. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
14. Annotate the appropriate maintenance and lab logbooks.
15. Return the system to normal operation.

4.10.18 Power Entry Module (PEM) Fuses (P/N 870-0008-14, -17, -24, -25)

Below, you will find an installation guide showing specific Facility Power Ratings and the proper fuse installation figure to use from this section. (Refer to Table 4.10.18 below)

Facility Power Rating	Figure to Use
100 Volts AC	**Figure 162**
110 Volts AC	Figure 162
115 Volts AC	Figure 162
120 Volts AC	**Figure 162**
125 Volts AC	Figure 162
200 Volts AC	Figure 163
220 Volts AC	**Figure 163**
230 Volts AC	Figure 163
240 Volts AC	**Figure 163**

Table 4.10.18 – Facility Power Rating and Fuse Conversion Chart

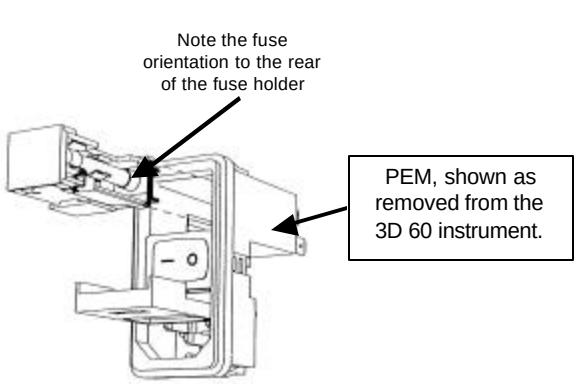
NOTE

The Power Entry Module (PEM) (805-0017-02) is located in the rear and lower left corner of the instrument. (See Figure 159)

When configured for 115VAC, the PEM has one “6.3 Amp 250V “time delay” fuse (870-0008-25). In addition, a conversion clip is located across the neutral line in the fuse holder (Refer to Figure 162). When configured for 230VAC, each PEM has two “5.0 Amp 250V “time delay” fuses (870-0008-24) (Refer to Figure 163).

CAUTION

This instrument comes configured for 240V operation. For other voltage settings, replace fuse(s) as instructed in this section and according to Table 4.10.18 - Facility Power Rating and Conversion Chart.



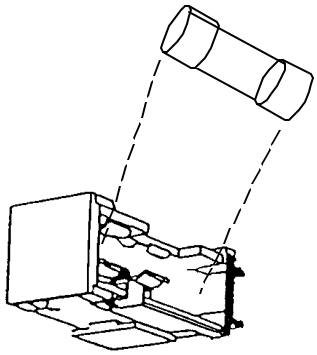


Fig. 157 - Power Entry Module w/Fuse Holder Removed **Fig. 158 - Fuse Holder Fuse Installation**

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.

4.10.18 Power Entry Module Fuses (P/N 870-0008-14, -17, -24, -25) (Continued)

Fig. 159 - PEM Fuse Removal w/Screwdriver

2. With a flat-tip screwdriver open the PEM cover to access the fuses. (Refer to Figure 159).

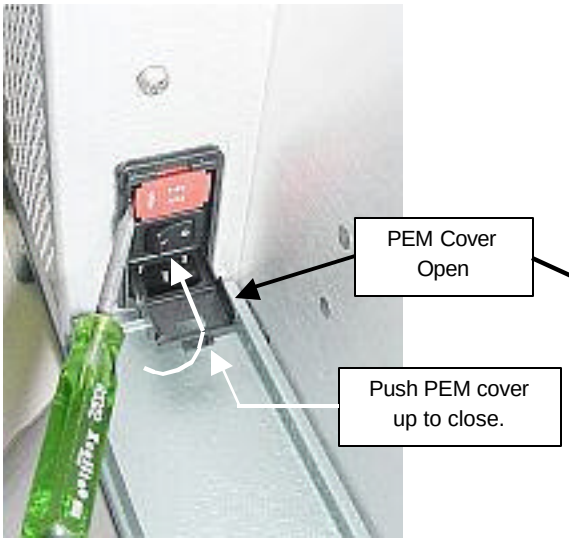


Fig. 160 - PEM Fuse Holder Removal

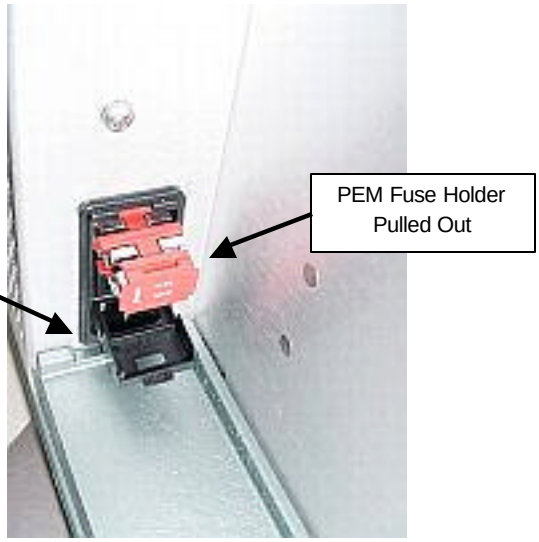


Fig. 161 - PEM Fuse Holder Pulled Out

3. Slide out the fuse holder (Refer to Figure 160 and Figure 161).
4. Determine which fuse(s) are defective and replace it (them) with a new fuse that has the proper amperage and voltage ratings.

4.10.18 Power Entry Module Fuses (P/N 870-0008-14, -17, -24, -25) (Continued)

NOTE

Refer to Figure 163 for 230 VAC version. Steps for replacing fuses in the 230 VAC version are the same as the steps taken with the 115 VAC version, with the exception of the fuse size and the 115V Conversion Clip (which is not used for the 230VAC). Remove and dispose of the conversion clip, if one is present.

CAUTION

Installation of the 115 V conversion clip (shown in Figure 162) into the 230 VAC version (Figure 163) COULD RESULT IN DAMAGE to the unit.

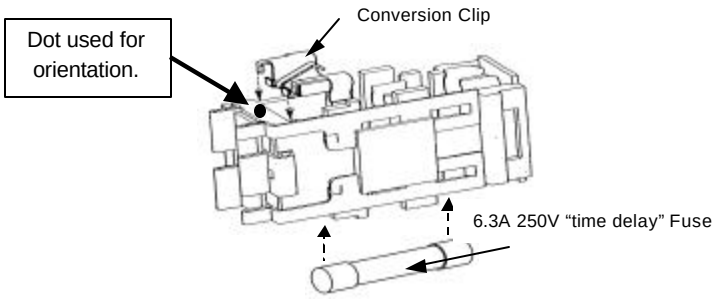


Fig. 162 - PEM w/115 VAC Version

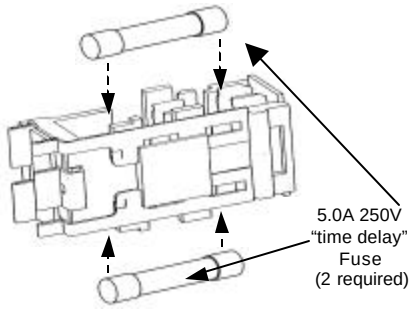


Fig. 163 - PEM w/230 VAC Version

5. Reinstall the fuse holder. (Refer to Figure 160 and Figure 161)
6. Close the PEM cover. (Refer to Figure 160)
7. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
8. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
9. Annotate the appropriate maintenance and lab logbooks.
10. Return the system to normal operation.

4.10.19 Fan (P/N 941-0009-07)

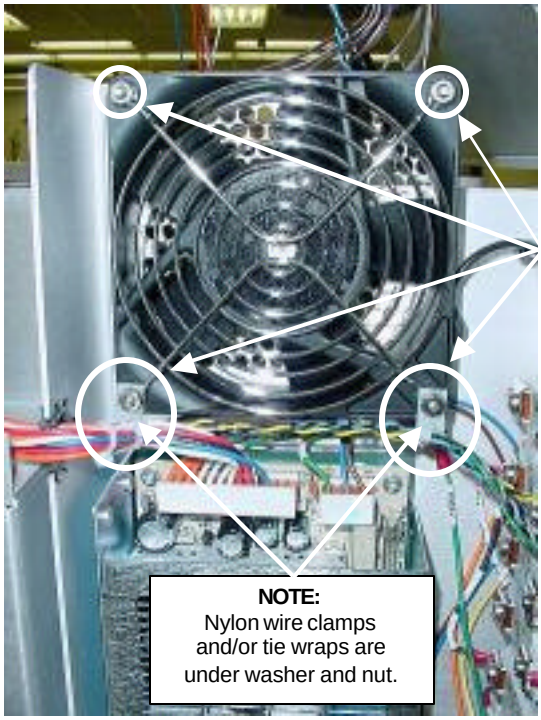


Fig. 164 - Fan – Inside View

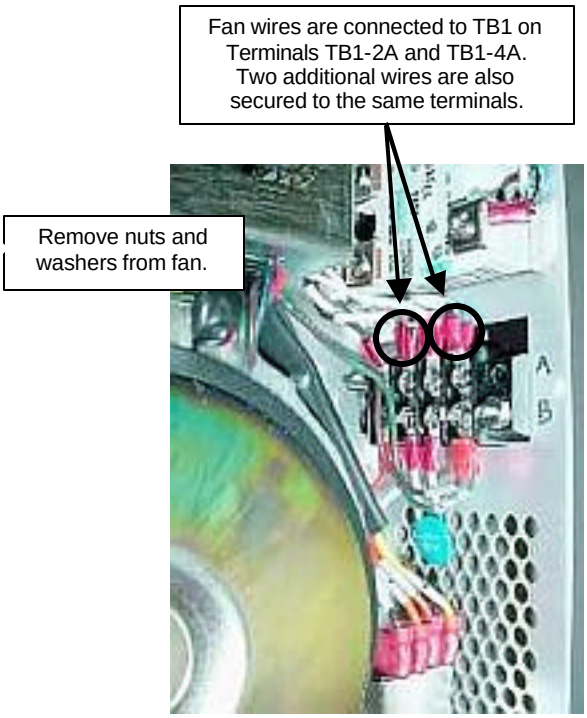


Fig. 165 - Fan Wiring Connections

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)

CAUTION
Proper ESD precautions must be observed whenever working on or around any PCBA.

3. Remove 3D 60 Instrument’s Right Side Panel and set the panel aside.
4. Depending on tools available, the fan wire disconnection from TB1 may be done using one of the following two methods, **a** or **b** below:
   a. If a right-angle screwdriver is used, remove the screws from TB1-2A and TB1-4A and disconnect the two fan wires and the two additional wires from the Terminal Block. Mark the wires, as appropriate, to facilitate proper reinstallation.
   b. If a right-angle screwdriver is not available, remove the bolt securing the Transformer to the chassis and set the transformer aside (with PEM wires still attached). Remove the screws from TB1-2A and TB1-4A and disconnect the fan wires and the additional two wires from the Terminal Block. Mark the wires, as appropriate, to facilitate proper reinstallation.

4.10.19 Fan (P/N 941-0009-07) (Continued)

5. Pull the fan power wires up and out of the Power Supply chassis.
6. Make note of the direction of the fan blades prior to removal of the fan.
7. Remove the four (4) screws, nuts and washers securing the fan to the System Power Panel. (Refer to Figure 164)

NOTE
Washers can fall into the chassis so hold on to them as you remove the nuts and screws. Also, note that the nuts and washers go over the fan grill and there are plastic clamps that hold wiring in place.

8. Remove the defective fan from the chassis and replace it with a new one.
9. Reinstall the four (4) screws from the back side of the Power Supply Chassis, push the new fan onto the screws and install the grill over the fan.
10. Push the two (2) wire clamps over the top of the grill on the bottom two fan screws. Install the washers then tighten the nuts. Both washers and screws are mounted on top of the nylon wire clamps.
11. Install washers and nuts on the top two (2) fan screws.
12. Route the fan power wires underneath the relays. Secure the wires to TB1-2A and TB1-4A then install the other two wires connected to the terminals on top of the fan power wires. Tighten the screws on terminals TB1-2A and TB1-4A.
13. Ensure that all wire connections are properly made. If the Transformer was removed in Step 4b, reinstall it and secure the mounting bolt to the chassis.
14. Reinstall the Right Side Panel on the instrument.
15. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
16. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
17. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
18. Annotate the appropriate maintenance and lab logbooks.
19. Return the system to normal operation.

4.10.20 Heater (P/N 847-0009-01)

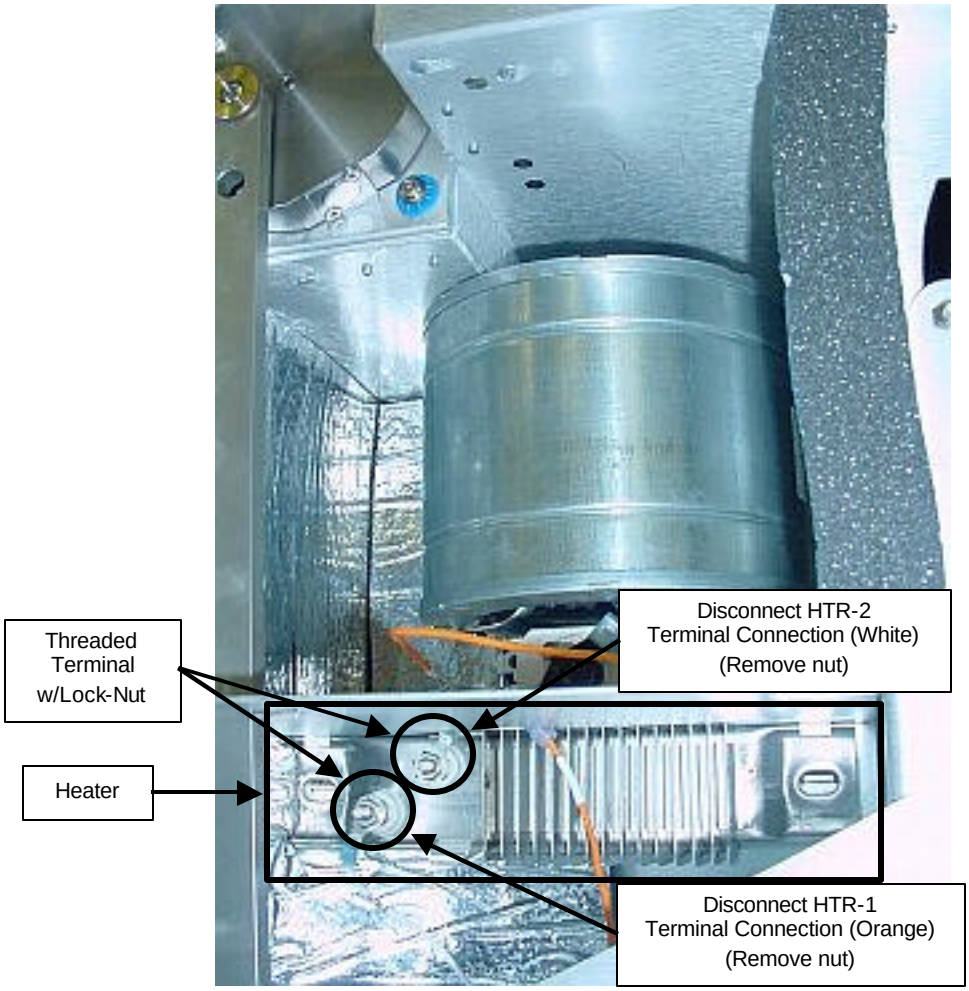


Fig. 166 - Heater Terminal Connectors

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)
3. Remove 3D 60 Instrument’s Left Side Panel and set the panel aside.
4. Disconnection HTR-1 and HTR-2 terminal wires by removing the nut on each terminal. (Refer to Figure 166)

4.10.20 Heater (P/N 847-0009-01) (Continued)

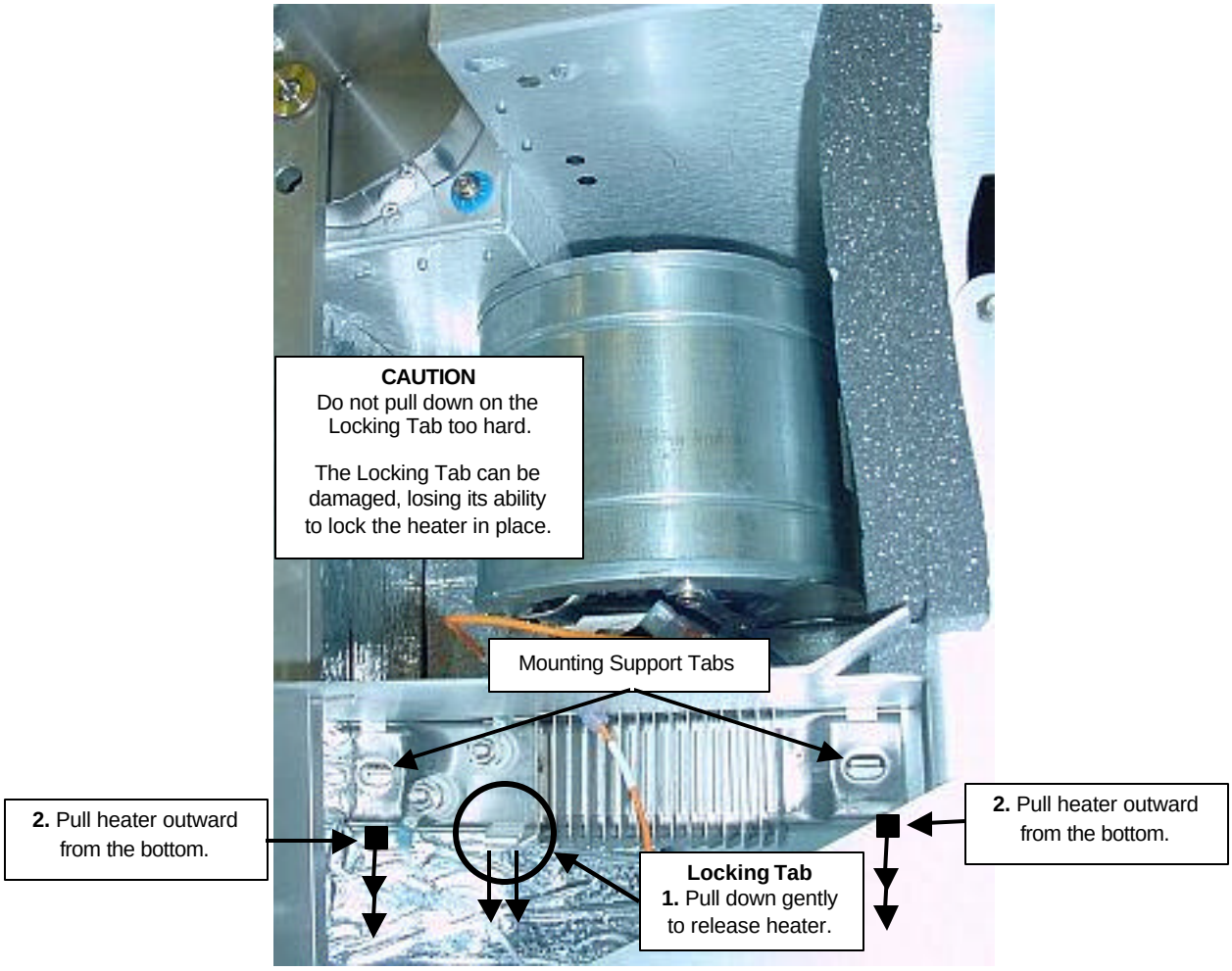


Fig. 167 - Heater Removal

5. Gently pull down on the Locking Tab and remove the Heater by pulling outward from the bottom of both ends. (Refer to Figure 167, Steps **1** and **2**)
6. Install the new heater by aligning the Support Tabs with the top holes in the Heater.
7. Push the bottom of both ends of the Heater inward until the Locking Tab locks the Heater in place. (Refer to Figure 167)
8. Reinstall the HTR-1 and HTR2 wires on the terminals and secure with lock-nuts. (Refer to Figure 166)
9. Reinstall the Left Side Panel. Use cardstock to cover the foam gasket around the door (in front) to prevent damage to the foam. Remove cardstock after panel is reinstalled.
10. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
11. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
12. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
13. Annotate the appropriate maintenance and lab logbooks.
14. Return the system to normal operation.

4.10.21 Blower Assembly (P/N 48411-1)

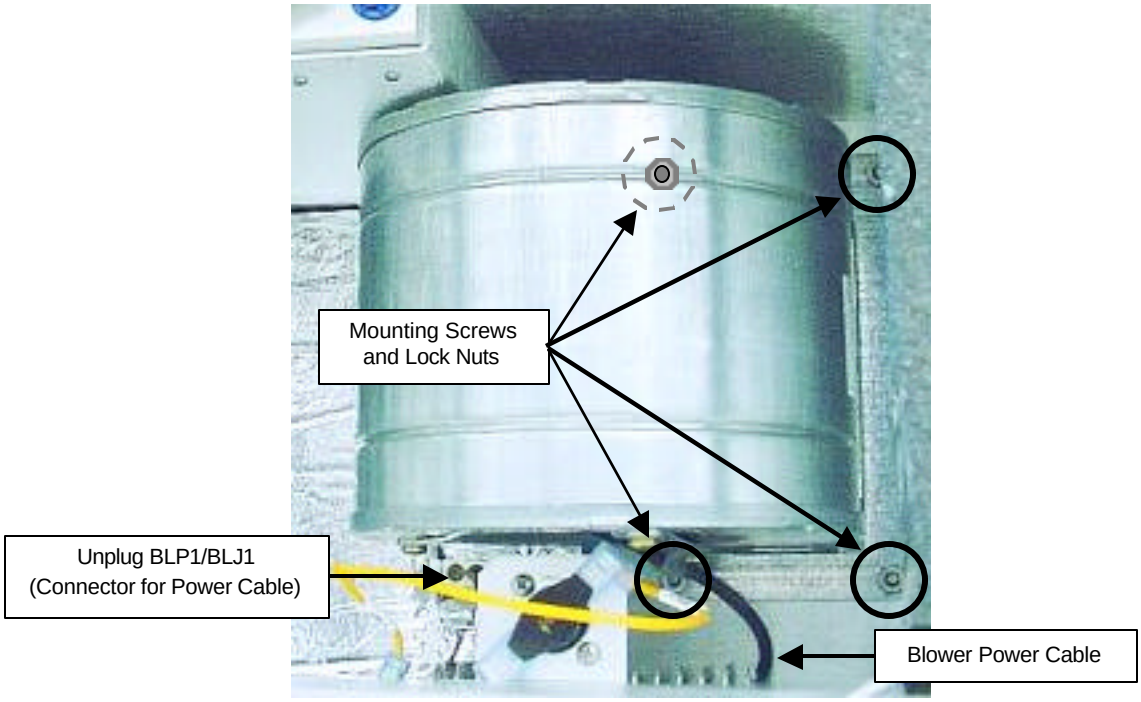


Fig. 168 - Blower Motor

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)
3. Remove 3D 60 Instrument’s Left Side Panel and set the panel aside.
4. Disconnect the Blower’s power cable at BLP1/BLJ1. (Refer to Figure 168)
5. Remove the four (4) mounting nuts from the screws as shown in Figure 168.
6. Remove the defective Blower from the instrument.
7. Install and align the new Blower in the system and install the nuts. Tighten the nuts in a “X” pattern to ensure alignment.
8. Reconnect the power cable BLP1/BLJ1.
9. Reinstall the Left Side Panel. Use cardstock to cover the foam gasket around the door (in front) to prevent damage to the foam. Remove cardstock after panel is reinstalled.
10. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
11. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
12. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
13. Annotate the appropriate maintenance and lab logbooks.
14. Return the system to normal operation.

4.10.22 Blower Motor Capacitor (P/N 601-0001-02)

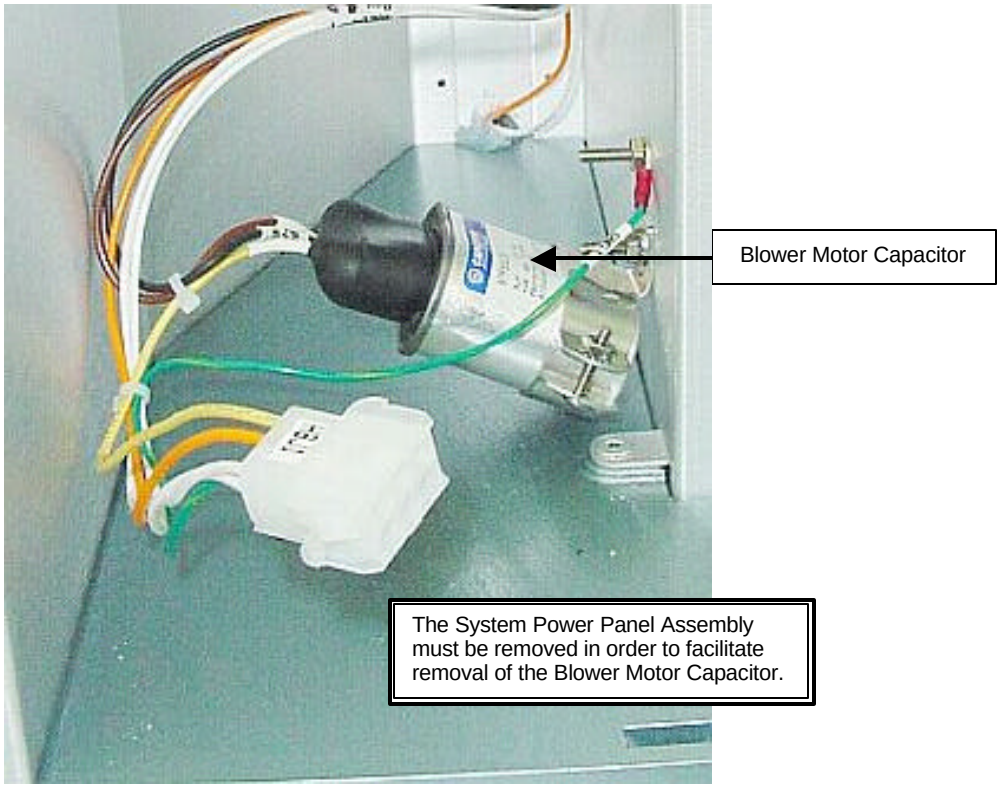


Fig. 169 - Blower Motor Capacitor

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)
3. Remove 3D 60 Instrument’s Right Side Panel and set the panel aside.

4.10.22 Blower Motor Capacitor (P/N 601-0001-02) (Continued)

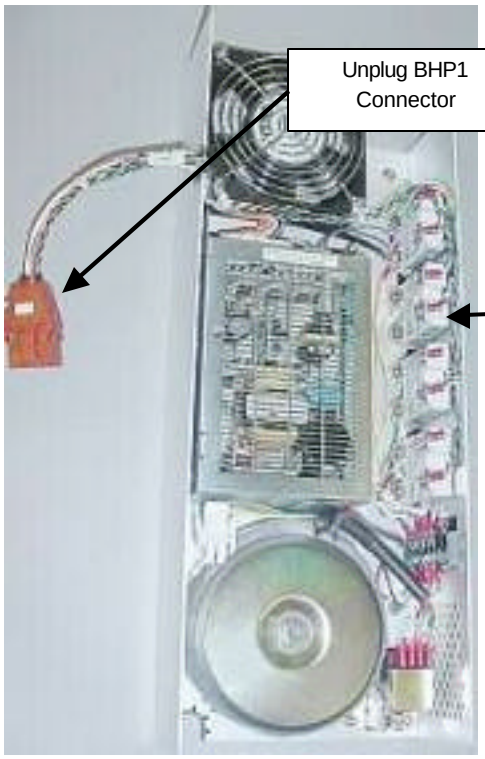


Fig. 170 - Power Supply Panel – BHP1 Connector

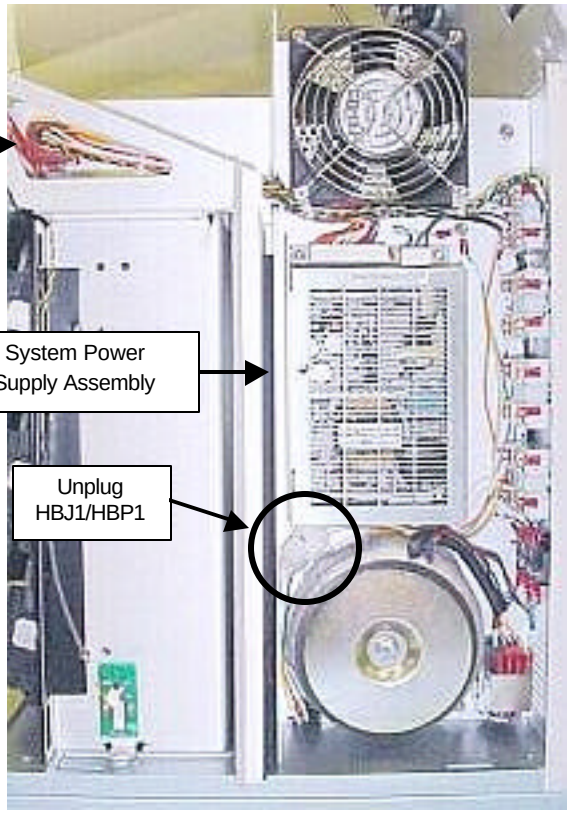


Fig. 171 - Power Supply Panel – HBJ1/HBP1 Connector

4. Unplug the HBP1/HBJ1 connectors from each other. (Refer to Figure 171)
5. Unplug BHP1 wiring connector coming from the Electronics Compartment to the System Power Supply Assembly. (Refer to Figure 170 and 171)

4.10.22 Blower Motor Capacitor (P/N 601-0001-02) (Continued)

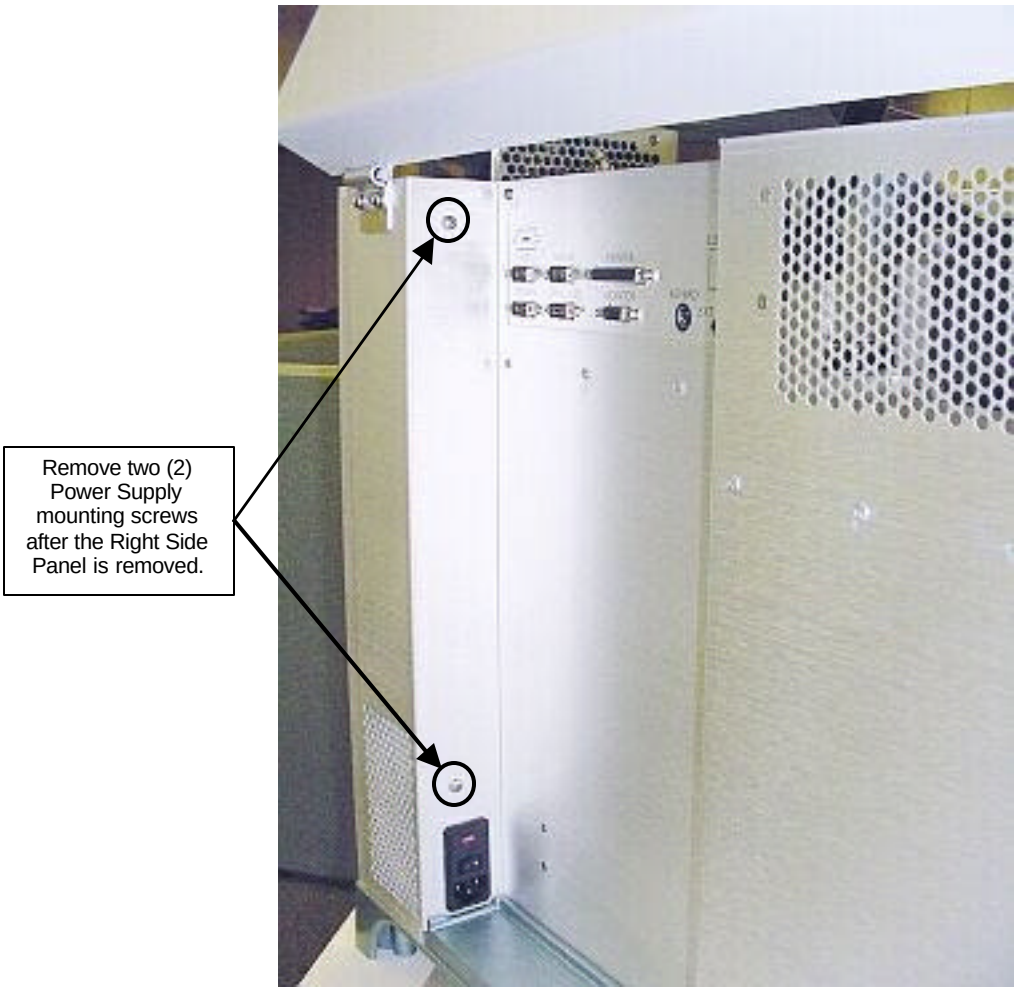


Fig. 172 - Power Supply Panel – Mounting Screw Removal

6. Remove the two (2) screws from the system chassis (in the rear of the instrument), in order to remove the System Power Supply Assembly. (Refer to Figure 172)
7. Lift the Power Supply Assembly up and out of the 3D 60 instrument. You may have to push the Top Panel beyond the normal locked position of the Gas Spring Assembly in order to clear the System Power Supply Assembly from the 3D 60 instrument.

4.10.22 Blower Motor Capacitor (P/N 601-0001-02) (Continued)

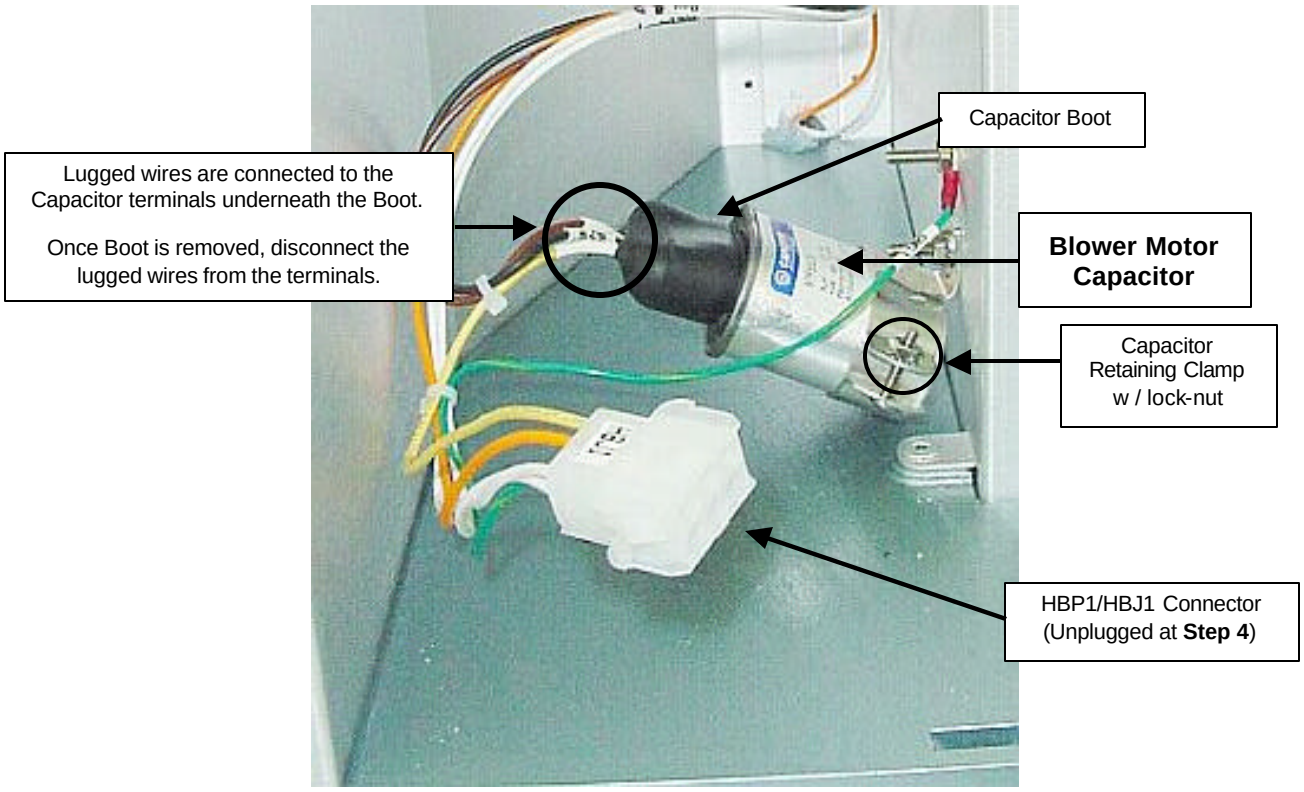


Fig. 173 - Blower Motor Capacitor – Boot and Clamp Removal

8. Once the System Power Supply Assembly is removed from the instrument's chassis, the Blower Motor Capacitor is exposed as shown in Figure 173 above. Remove the Boot from the defective Capacitor.
9. Once the Boot is removed, lugged wires are exposed. Unplug the lugged wires from the terminals on the Capacitor. Ensure that you know the proper terminal locations and colors of the wires (diagram it or write them down) so that they are reinstalled properly on the new capacitor. (Refer to Figure 173)
10. Remove the lock-nut from the Capacitor's Retaining Clamp. Slide the capacitor out of the Retaining Clamp and set it aside. (Refer to Figure 173)
11. Install the new capacitor into the retaining clamp. Install the lock-washer and tighten it.
12. Reconnect the lugged wire connectors to their respective terminals on the Capacitor; as noted in Step 9 above.
13. Reinstall the System Power Supply Assembly back into the 3D 60 chassis. Refer to previous removal steps in this section.
14. Reinstall the two (2) screws into the system chassis (in the rear of the instrument), in order to secure the System Power Supply Assembly. (Refer to Figure 172)
15. Plug HBP1/HBJ1 connectors back into each other. (Refer to Figure 171)
16. Plug BHP1 back into BHJ1. (Refer to Figure 170 and 171)

4.10.22 Blower Motor Capacitor (P/N 601-0001-02) (Continued)

17. Reinstall the Left Side Panel on the instrument. Prior to installing the panel, use cardstock to cover the foam gasket around the door (in front of the instrument) to prevent damage to the foam. Remove the cardstock after the Right Side Panel is reinstalled.
18. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
19. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
20. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
21. Annotate the appropriate maintenance and lab logbooks.
22. Return the system to normal operation.

4.10.23 Digital Reference Thermometer (P/N 848-0004-01)

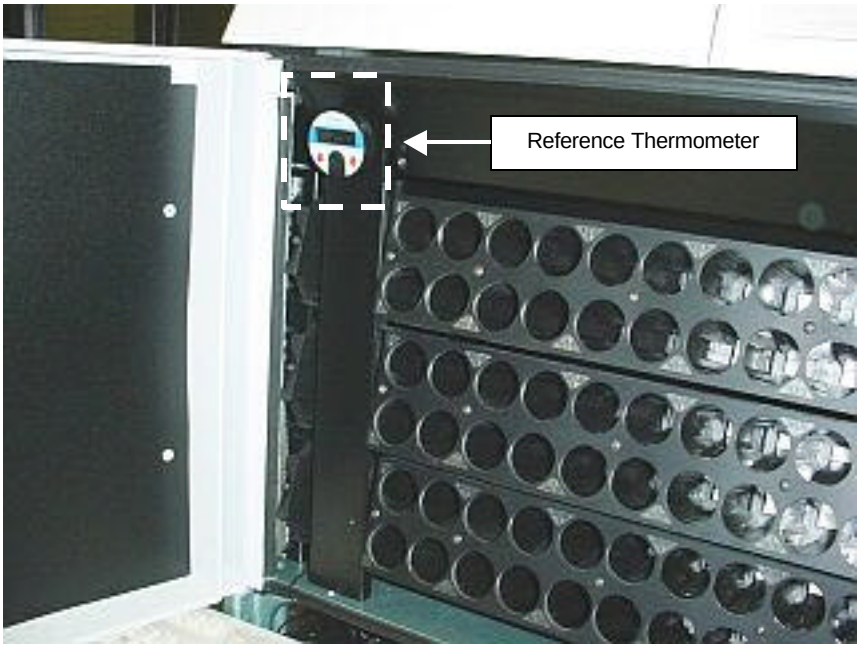


Fig. 174 - Reference Thermometer

1. Open the door on the 3D 60 instrument.
2. Note that the digital thermometer is installed on the top-left side. (Refer to Figure 174)

NOTE
Steps for removal of digital reference thermometer are not available at the time of publication of this manual. Service bulletin will be published for replacement procedures at a later date.

3. Remove the defective thermometer from the bracket and replace it with a new one.
4. Close the door on the instrument.
5. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
6. Annotate the appropriate maintenance and lab logbooks.
7. Return the system to normal operation.

4.10.24 Rack Assembly (P/N 43147-921, -922, -923)

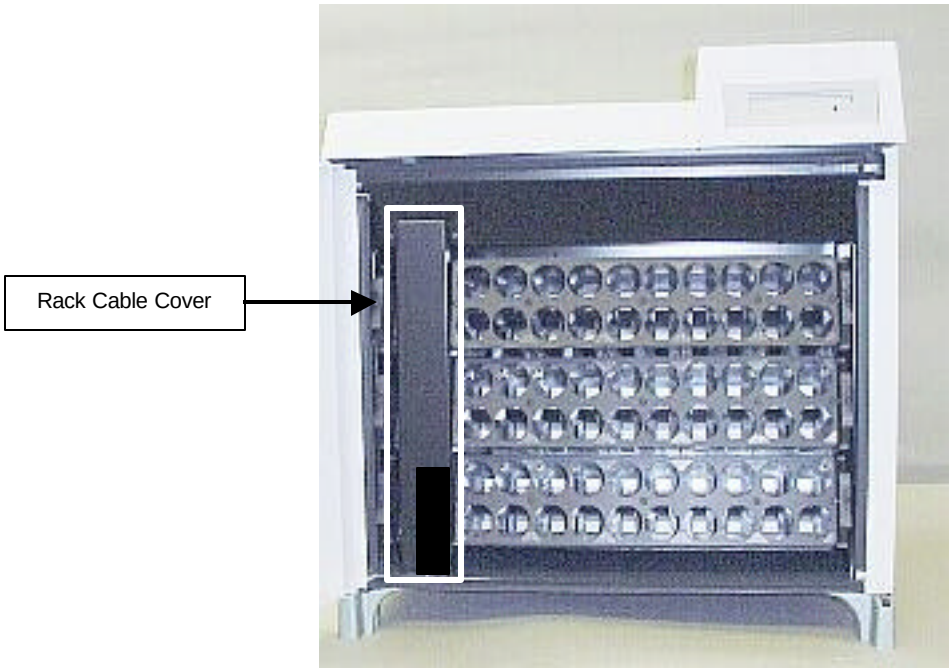


Fig. 175 - Rack Blocks Installed

1. Ensure the rack being replaced is empty and disabled (See Rack Enabling and Disabling in the 3D 60 Operator's Manual) Relocate the bottles that are in the defective rack, if necessary.
2. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
3. Remove the two (2) screws securing the Top Panel and secure it into the "Up" position. (Refer to Figure 99 for screw removal locations)
4. Remove the two (2) screws securing the Rack Cable Cover to the chassis. (Refer to Rack Cable Cover removal steps in the 3D 60 Operator's Manual)

4.10.24 Rack Assembly (P/N 43147-921, -922, -923) (Continued)

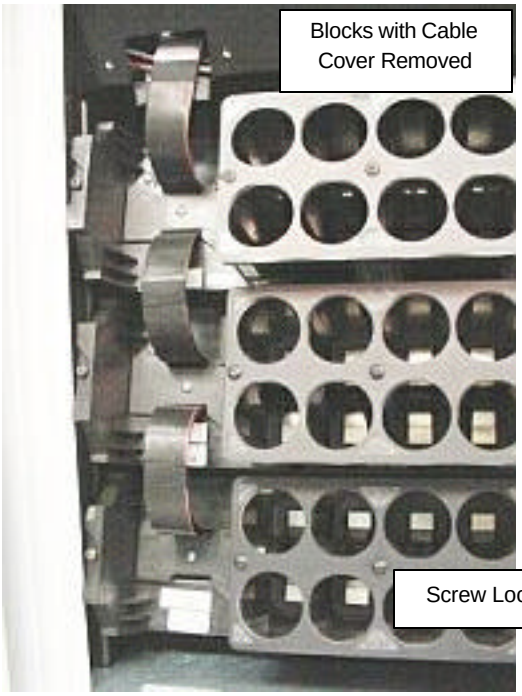


Fig. 176 - Rack Assembly w/Cable Cover Removed

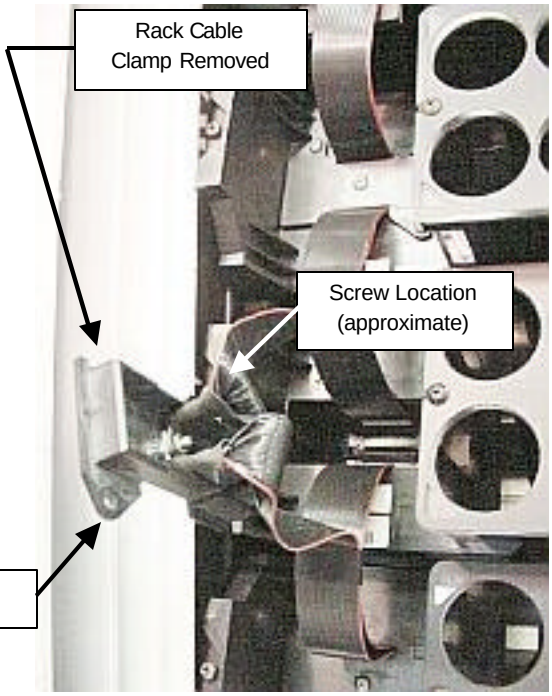


Fig. 177 - Rack Cable Clamp Removed

5. Remove the two (2) screws that secure the Rack Cable Clamp of the defective rack being replaced (Refer to Figure 177).

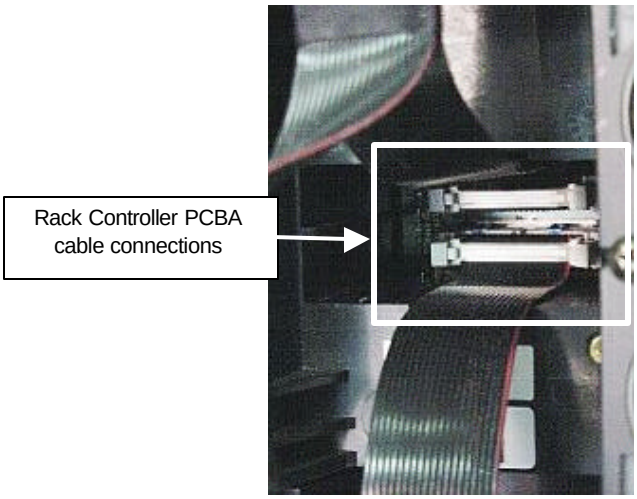


Fig. 178 - Rack Cable Disconnection

6. Disconnect the cable(s) from the Rack Controller PCBA (Refer to Figure 178)

4.10.24 Rack Assembly (P/N 43147-921, -922, -923) (Continued)

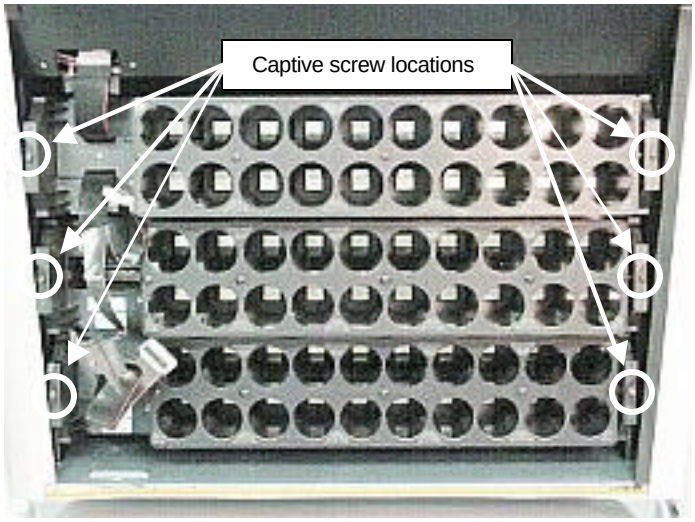


Fig. 179 - Rack Assembly –Captive Screw Removal

7. Loosen the two (2) Captive Screws located at either end of the defective Rack Assembly. (Refer to Figure 179)
8. Slide the Rack Assembly out of the instrument. Disinfect the rack, if necessary.
9. Remove the two (2) screws securing the Rack Cable Clamp of the new Rack Assembly. Remove the ground cable from the old Rack Cable Clamp. Retain the old parts and return them with the defective Rack Assembly.
10. Disconnect the daisy-chained cables from the Rack Interface PCBA connectors.
11. Install ground cables on the new Rack Cable Clamp.
12. If replacing a rack with cells 1 through 20 or 21 through 40, remove the plug from P1 on the Rack Interface PCBA. Retain these parts and return them with the defective Rack Assembly.
13. Slide the new rack into the instrument and tighten the two (2) Captive Screws. (Refer to Figure 179 for screw locations)
14. Plug the rack cable connectors (daisy-chained cables) of the Rack Assembly into the appropriate sockets on the Rack Interface PCBA. (Refer to Figure 178)

4.10.24 Rack Assembly (P/N 43147-921, -922, -923) (Continued)

15. Secure the cable assembly in the Cable Clamp.
16. Replace the Rack Cable Cover and secure it with two (2) mounting screws.
17. Close the door of the instrument.
18. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
19. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
20. Enable the Rack. (Refer to the 3D 60 Operator's Manual – Enabling and Disabling Racks and Cells.
21. Recalibrate the Rack according to Rack Calibration instructions in the Operator's Manual.
22. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
23. Annotate the appropriate maintenance and lab logbooks.
24. Return the system to normal operation.

4.10.25 Step-5 Drive Agitation Linkage Assembly (P/N 48418-1)

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)
3. Remove 3D 60 Instrument’s Left Side Panel and set the panel aside.

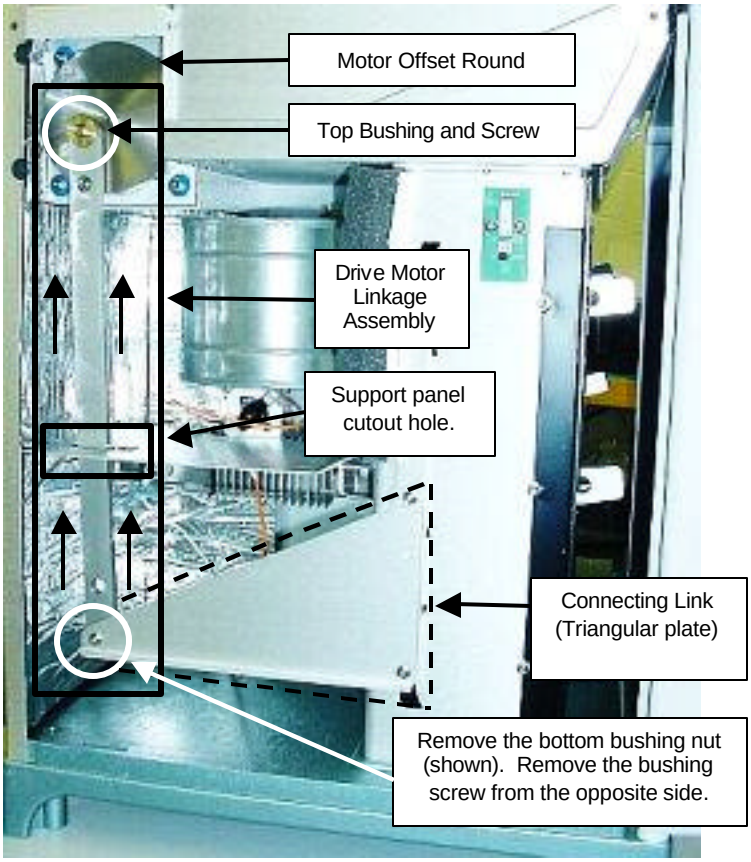


Fig. 180 - Step-5 Drive Agitation Linkage Assembly

4. Remove the bottom bushing nut. (Refer to Figure 180)
5. From the reverse side of the Connecting Link (the triangular panel), remove the bottom bushing screw from the Linkage Assembly with a Phillips screwdriver.
6. Remove the two (2) set screws from the Motor Offset Round. (Refer to Subsection 4.10.9 - Step-5 Motor – Set Screw Removal, Figure 132)

4.10.25 Step-5 Drive Agitation Linkage Assembly (P/N 48418-1) (Continued)

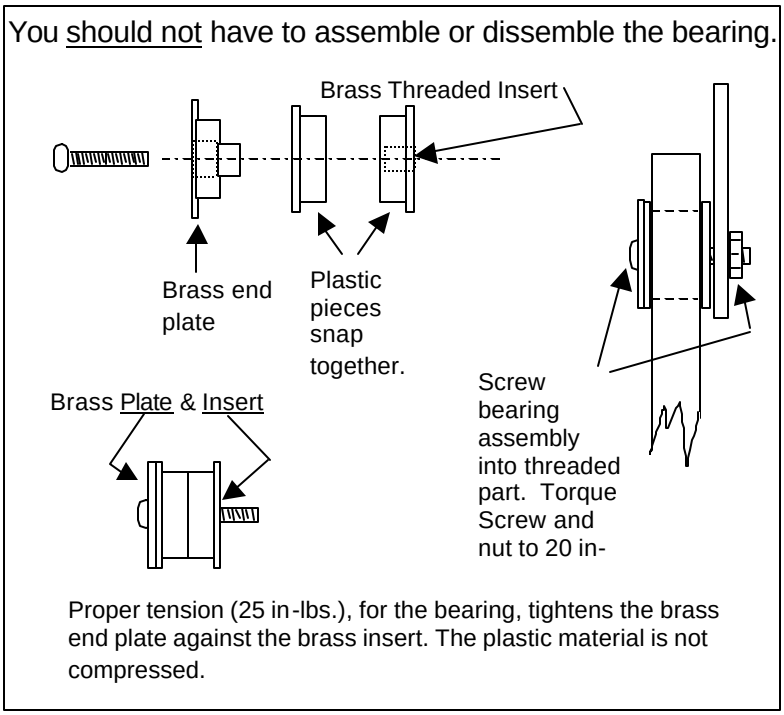


Fig. 181 - Drive Linkage and Bushing Specs

7. Slide the entire Drive Linkage Assembly (with Motor Offset Round attached to Drive Linkage) up and out of the 3D 60 instrument. The bottom part of the Linkage slides through the cutout hole in the support panel. (See up-arrows shown in Figure 180)

   When removing the entire Drive Linkage/Offset Round assembly, you will have to pull the Motor Offset Round slightly towards you to slide the Offset Round off of the Step-5 Motor's drive shaft.
8. Separate (remove) the Drive Linkage Assembly from the Motor Offset Round by removing the bushing nut on the reverse side of the Offset Round.
9. Remove the bushing screw from the Drive Linkage Assmbly (shown in Figure 180). Set the Drive Linkage Assembly aside.
10. Install the new Drive Linkage Assembly onto the Motor Offset Round by inserting the top bushing screw through Linkage Assembly and the Motor Offset Round. Torque the bushing screw to 20 in-lbs.
11. Install the top bushing nut (located on the reverse side of the Offset Round) onto the bushing screw. Torque the bushing nut to 20 in.-lbs.

4.10.25 Step-5 Drive Agitation Linkage Assembly (P/N 48418-1) (Continued)

NOTE

An Offset Round Spacing tool (part number to be determined) is required to properly space the system chassis from the Motor Offset Round (prior to installing the Offset Round onto the Drive Motor shaft). The tool is insterted between the system's chassis and the Motor Offset Round prior to reinstalling the set screws into the Offset Round.

12. Reinstall the combined Motor Offset Round/Drive Linkage Assembly by sliding the bottom part of the Linkage Bar through the cutout hole in the support plate. Slide the Motor Offset Round onto the Motor's Drive Shaft. Leave enough room between the Offset Round and the system chassis to slide the spacing tool in between.
13. With spacing tool properly inserted between the Motor Offset Round and the system chassis, reinstall the Motor Offset Round's set screws. (Refer to Subsection 4.10.9 - Step-5 Motor – Set Screw Removal, Figure 132, for reinstallation of the set screws.)
14. Align the Drive Linkage Assembly's bottom bushing screw-hole with the hole in the Connecting Link. Insert the bushing screw through the reverse side of the Linkage Assembly's brass bushing and torque the screw to 20 in.-lb.
15. Install the bushing nut onto the bottom bushing screw and torque to 20 in.-lbs.
16. Reinstall the Left Side Panel on the instrument.
17. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
18. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
19. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
20. Annotate appropriate maintenance and logbooks.
21. Return the system to normal operation.

4.10.26 Gas Spring Assembly (P/N 926-0037-01)

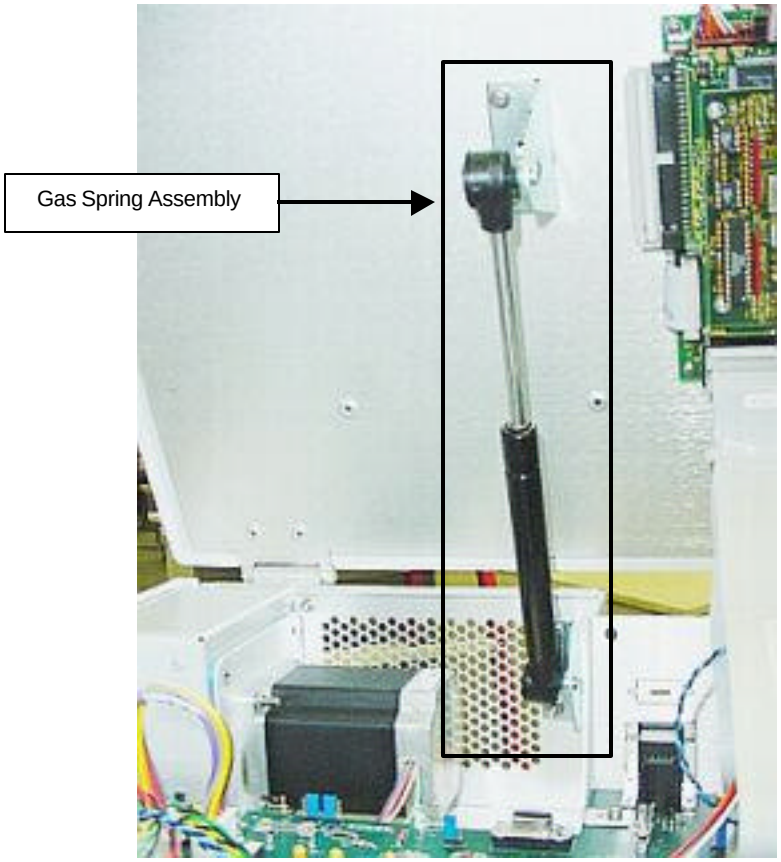


Fig. 182 - Gas Spring Assembly

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)

4.10.26 Gas Spring Assembly (P/N 926-0037-01) (Continued)

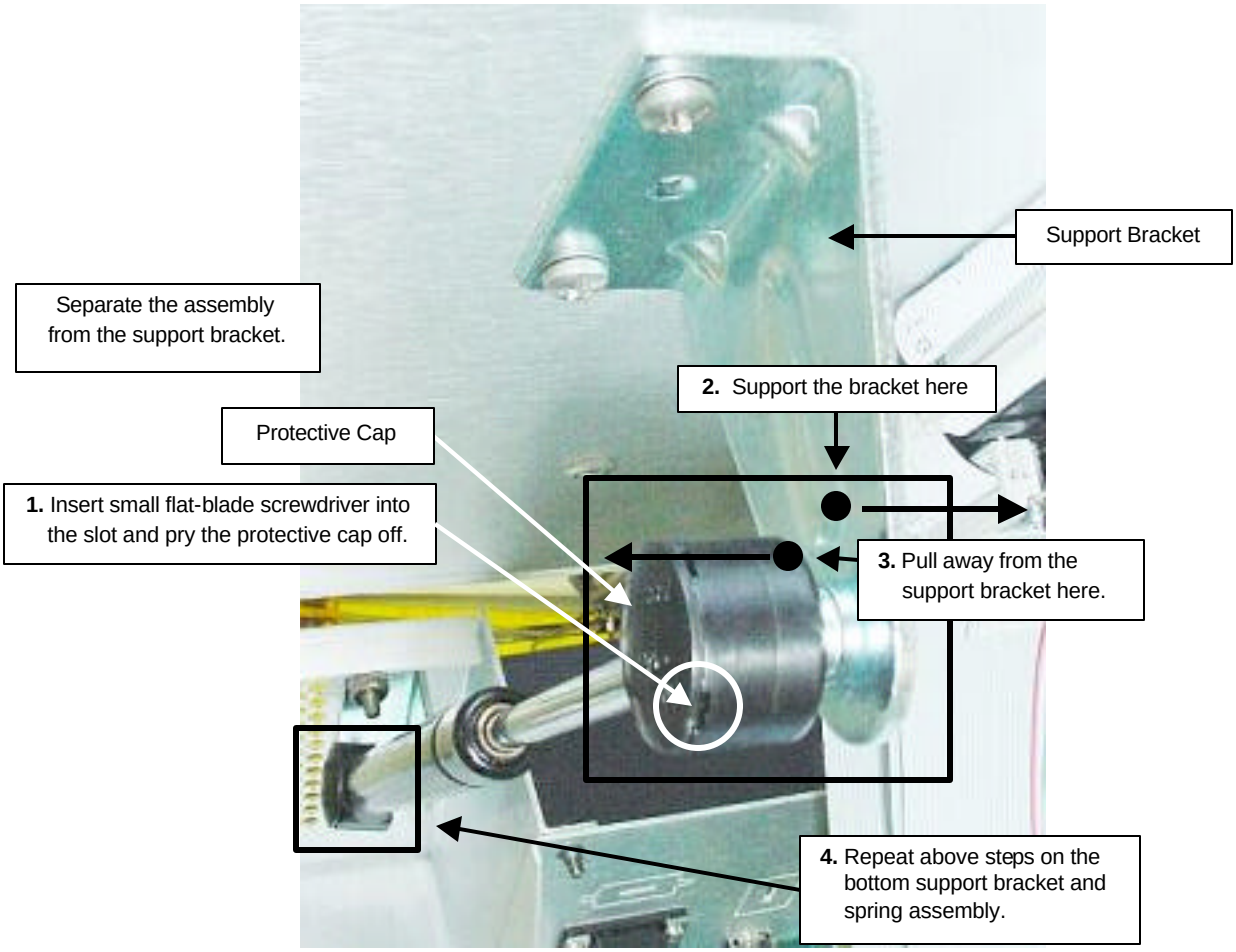


Fig. 183 - Gas Spring Assembly Removal

3. Remove the protective cap with a small flat blade screwdriver. (Refer to Figure 183)
4. While holding the support bracket at dot **2.** in the diagram above, pull and separate the Spring Assembly from the support bracket. The spring assembly (socket) and the support bracket (ball joint), essentially serve as a ball joint and socket assembly. It does require a bit of force to separate the two from each other.
5. Repeat Steps 3 and 4 to remove the Bottom Support Bracket and separate the spring assembly (socket) from the bottom bracket (ball joint).
6. Install the new Gas Spring Assemby by reversing the above steps. Ensure that the protective caps are securely replaced on both the top and bottom.
7. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
8. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
9. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
10. Annotate appropriate maintenance and logbooks.
11. Return the system to normal operation.

4.10.27 Magnetic Door Switches (P/N 841-0012-01)

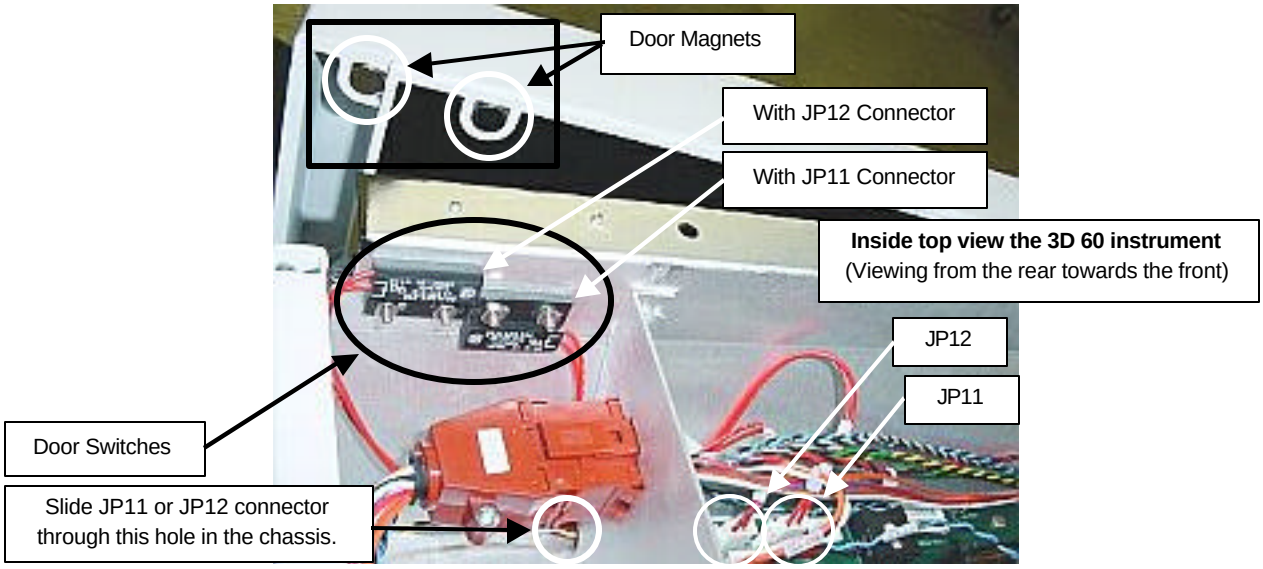


Fig. 184 - Magnetic Door Switches

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Remove the two (2) screws securing the Top Panel and secure it into the “Up” position. (Refer to Figure 99 for screw removal locations)
3. Open the door of the instrument slightly to view the door magnets. (Refer to Figure 184)
4. Determine which door switch is defective. The door switch LEDs are located on the ModSig PCBA at D55 and D56. (Refer to Figure 185 on the next page)
5. Remove the two (2) nuts that secure the defective Door Switch to the instrument chassis.
6. Unplug the door switch connector at JP11 or JP12 on the ModSig PCBA, depending on which door switch is defective.
7. Slide JP11 or JP12 connector through the circular cut-out hole in the chassis. The connector must go through vertically to fit through the hole.

NOTE
The front mounting screws of the ModSig PCBA may have to be loosened in order to facilitate sliding the JP11 or JP12 switch connectors through the hole in the chassis.
(Refer to Figure 121 – ModSig Mounting Screw Locations)

8. Install the new Door Switch onto the chassis, secure it with two (2) nuts and tighten them.

4.10.27 Magnetic Door Switches (P/N 841-0012-01) (Continued)

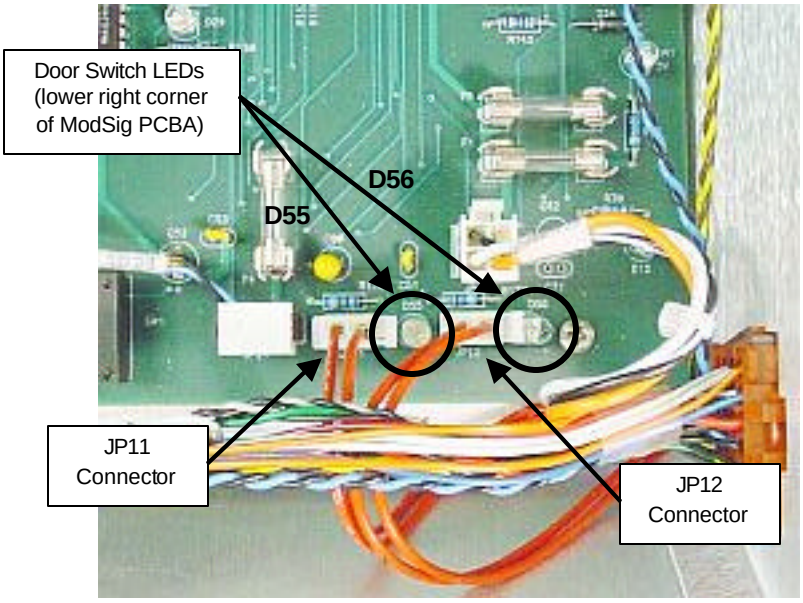


Fig. 185 - Door Switch LEDs – ModSig PCBA

9. Slide connector JP11 or JP12 through the circular hole in the chassis. (Refer to Figure 184)
10. Plug in JP11 or JP12 connector into the JP11 or JP12 socket on the ModSig PCBA.
11. Close the System Top Panel and secure it with two (2) screws. (Refer to Figure 99)
12. Close the door on the 3D 60 instrument.
13. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
14. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
15. Annotate appropriate maintenance and logbooks.
16. Return the system to normal operation.

4.10.28 Keyboard (P/N 957-0004-373)

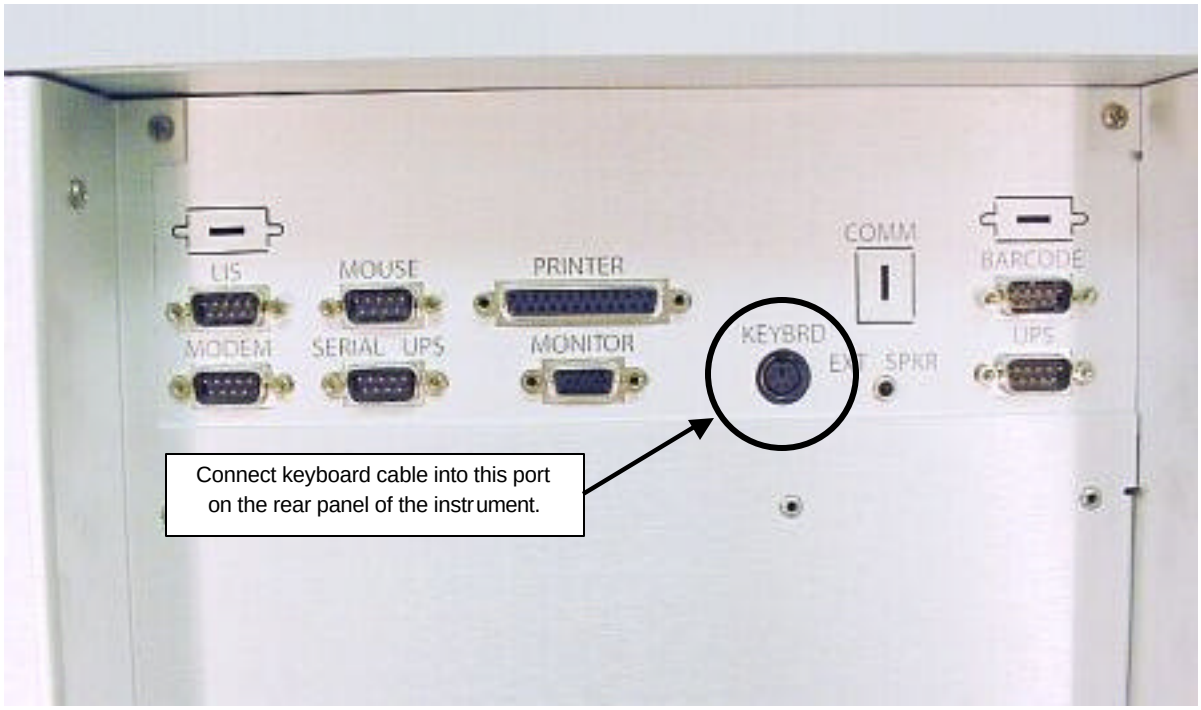


Fig. 186 - 3D 60 Rear Panel – Keyboard Port Connection

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Disconnect the keyboard cable connector from the '**Keyboard**' port on the rear panel of the 3D 60 Instrument. (Refer to Figure 186).
3. Connect the new keyboard to the PS2 port connector labeled '**Keyboard**' on the rear panel of the instrument.
4. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
5. If the keyboard is still not working, refer to Subsection 4.7.2, Table 4.7.1– *Diagnostics and Troubleshooting for the Keyboard*. Also check PS2 connector on the ModSig Board for damage.
6. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
7. Annotate appropriate maintenance and logbooks.
8. Return the system to normal operation.

4.10.29 Barcode Scanner (P/N 957-0004-291)

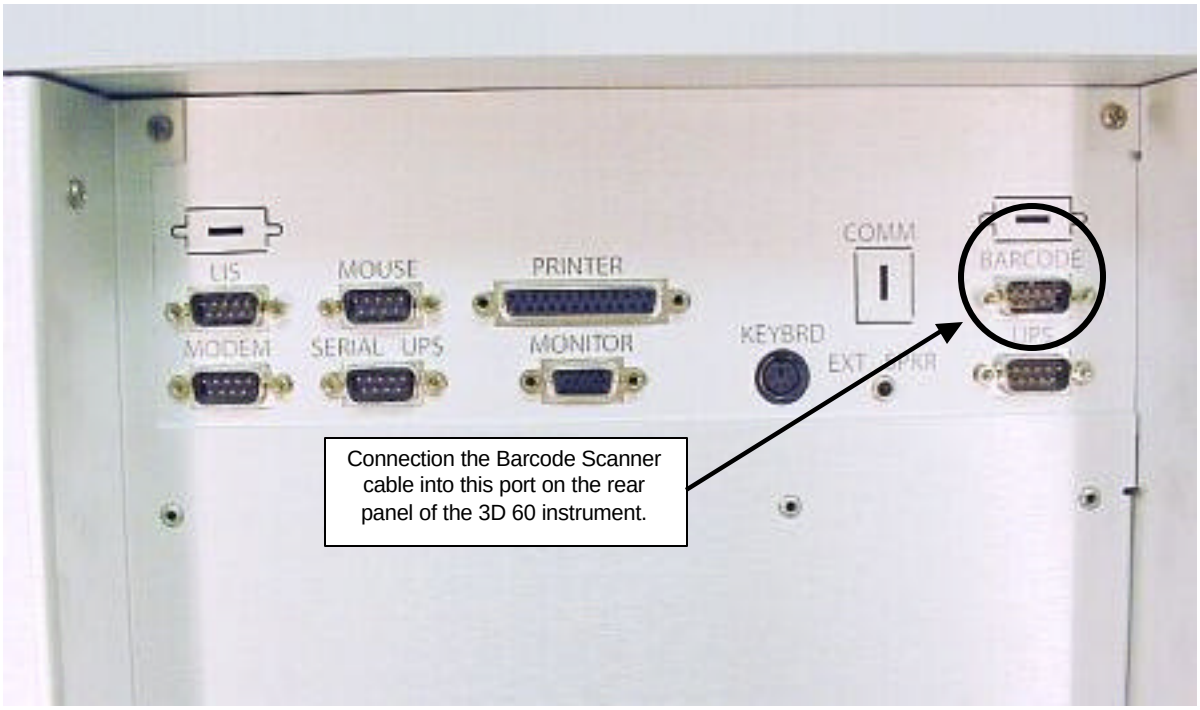


Fig. 187 - 3D 60 Rear Panel – Barcode Scanner Port Connection

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Unplug the Barcode Scanner's cable connector from the port on the rear panel of the 3D 60 Instrument labeled '**Barcode**'. (Reference Figure 187)
3. Plug in the connector on the new Barcode Scanner into the port labeled '**Barcode**'.
4. Refer to Subsection 4.3.3 and perform the 3D 60 Power Up procedure.
5. If the barcode wand is still not working, refer to Subsection 4.7.2, *Table 4.7.1. – Diagnostics and Troubleshooting for the Barcode Scanner.* Also check the ModSig Board for connector damage.
6. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
7. Annotate appropriate maintenance and logbooks.
8. Return the system to normal operation.

4.10.30 Domestic 56K Fax Modem (P/N 957-0004-342)

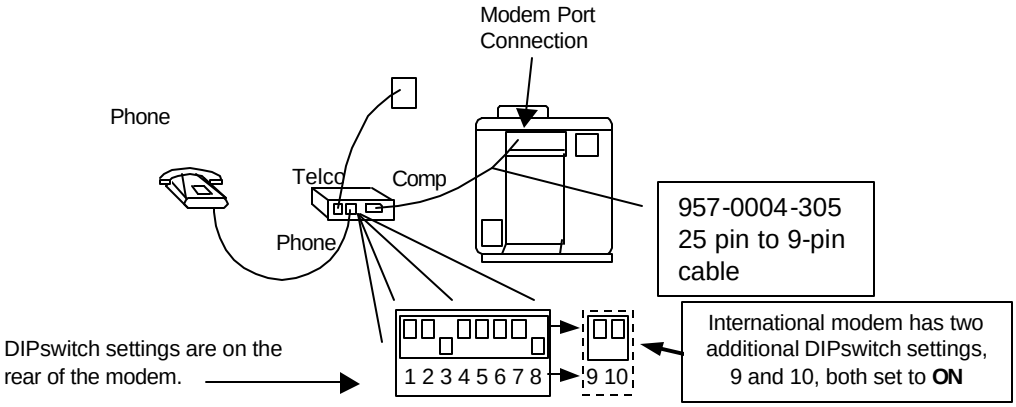


Fig. 188 - Fax Modem Port Connections (Domestic Model)

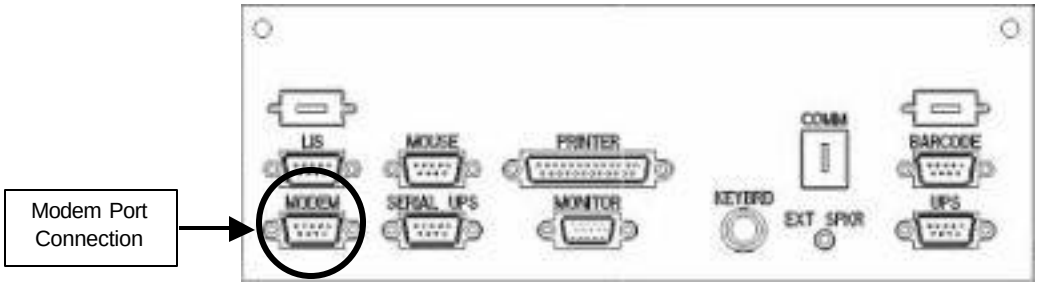


Fig. 189 - Domestic 56K Fax Modem – Rear Port Connection

1. Disconnect the fax modem cable from the **Modem** port on the rear of the 3D 60 Instrument. (Refer to Figure 189) Disconnect the same cable from the fax modem. (Refer to Figure 188) Disconnect the AC Adapter.
2. Disconnect the **Phone** cable from the fax modem. (Refer to Figure 188)
3. Disconnect the telephone **Line In** (Telco) cable from the fax modem and set the defective fax modem aside.
4. Connect the fax modem cable to the **Modem** port on the rear of the 3D 60 Instrument and connect the other end to the fax modem. (Refer to Figure 189 and Figure 188)
5. Connect the **Phone** cable from the fax modem. (Refer to Figure 188)
6. Connect the telephone **Line In** (Telco) cable to the fax modem. (Refer to Figure 188)
7. Ensure modem DIP switch setting are as shown in Figure 188.
8. Connect the AC Adapter to the modem and return the system to normal operation.

4.10.31 International Fax Modem (P/N 957-0004-364)

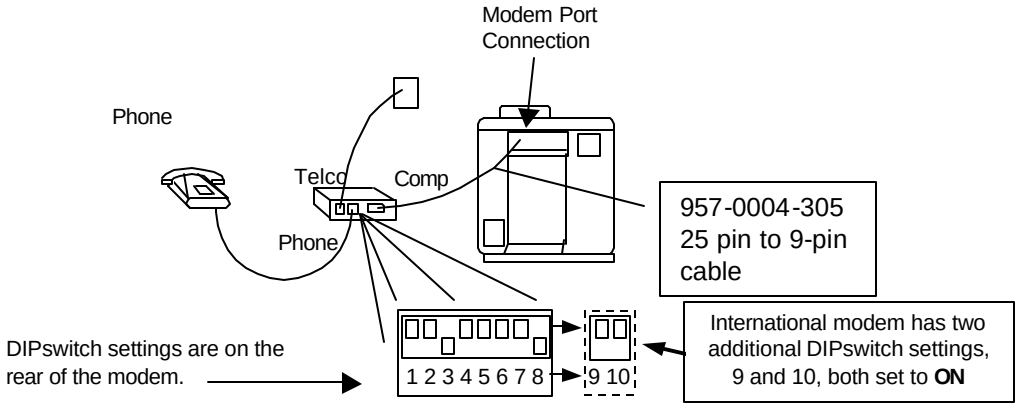


Fig. 190 - Modem Port Connections (International Model)

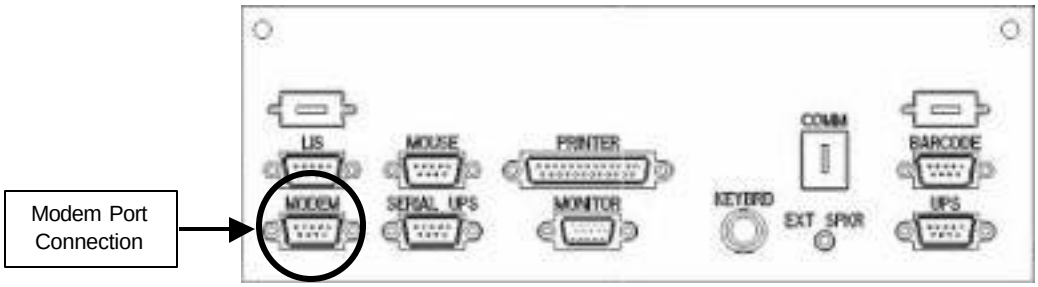


Fig. 191 - International 56K Fax Modem – Rear Port Connection

1. Disconnect the fax modem cable from the **Modem** port on the rear of the 3D 60 Instrument. (Refer to Figure 191) Disconnect the same cable from the fax modem. (Refer to Figure 190)
2. Disconnect the **Phone** cable from the fax modem. (Refer to Figure 190)
3. Disconnect the telephone **Line In** (Telco) cable from the fax modem and set the defective fax modem aside. (Refer to Figure 190)
4. Connect the fax modem cable to the **Modem** port on the rear of the 3D 60 Instrument and connect the other end to the fax modem. (Refer to Figure 191 and Figure 190)
5. Connect the **Phone** cable to the fax modem. (Refer to Figure 190)
6. Connect the telephone **Line In** (Telco) cable to the fax modem. (Refer to Figure 190)
7. Ensure modem DIP switch setting are as shown in Figure 190.
8. Connect the AC Adapter to the modem and return the system to normal operation.

4.10.32 APC Back-UPS Model 650 (Domestic Model) (P/N 957-0060-02)

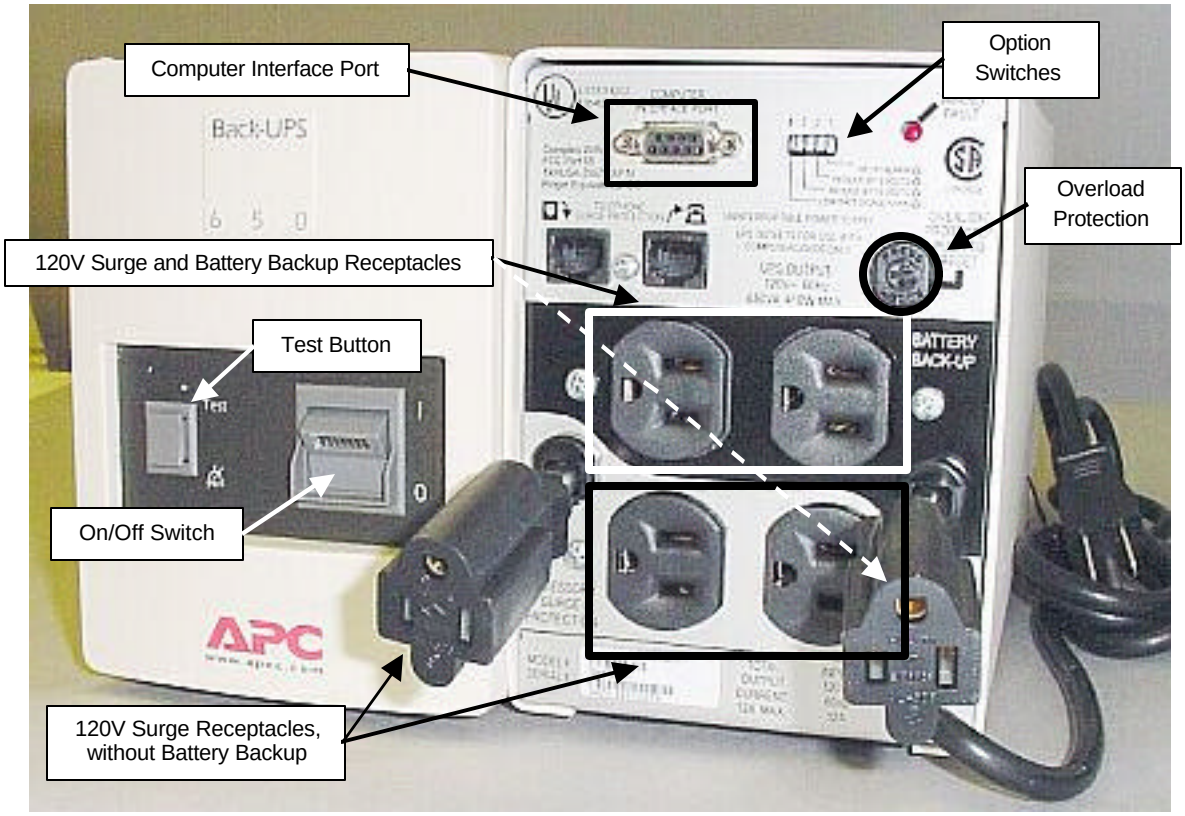


Fig. 192 - APC UPS Domestic Model – Back-UPS 650 (120V) (Front and Rear View)

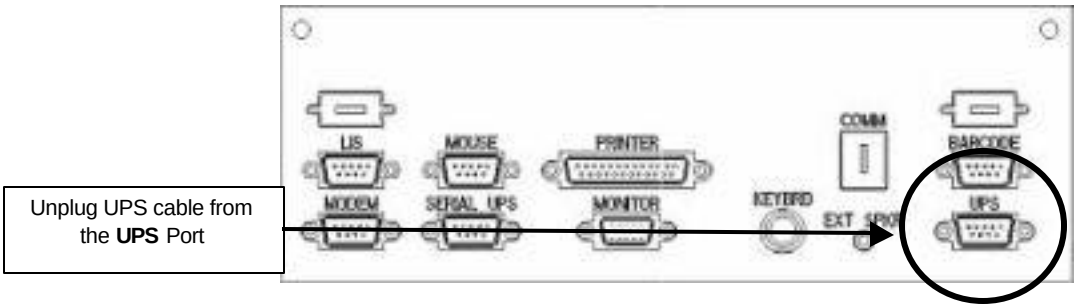


Fig. 193 - 3D 60 System Rear Communications Ports (UPS Cable Connection)

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Unplug the UPS cable from the **UPS** Port on the rear of 3D 60 Instrument and the opposite end of the cable from the **Computer Interface Port** on the defective UPS. Set the UPS aside. (Refer to Figures 192 and 193)

4.10.32 APC Back-UPS Model 650 (Domestic Model) (P/N 957-0060-02) (Continued)

Fig. 194 - UPS Battery Connection Preparation

3. Unpack the new UPS from the box. (Refer to Figure 194)

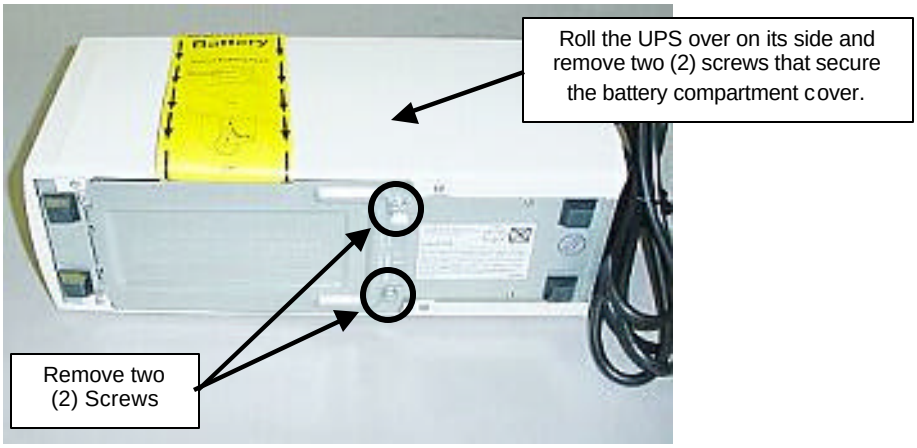


Fig. 195 - UPS Battery Cover Removal

4. Lay the UPS on its side and remove the two (2) screws from the battery compartment cover. (Refer to Figure 195)

4.10.32 APC Back-UPS Model 650 (Domestic Model) (P/N 957-0060-02) (Continued)

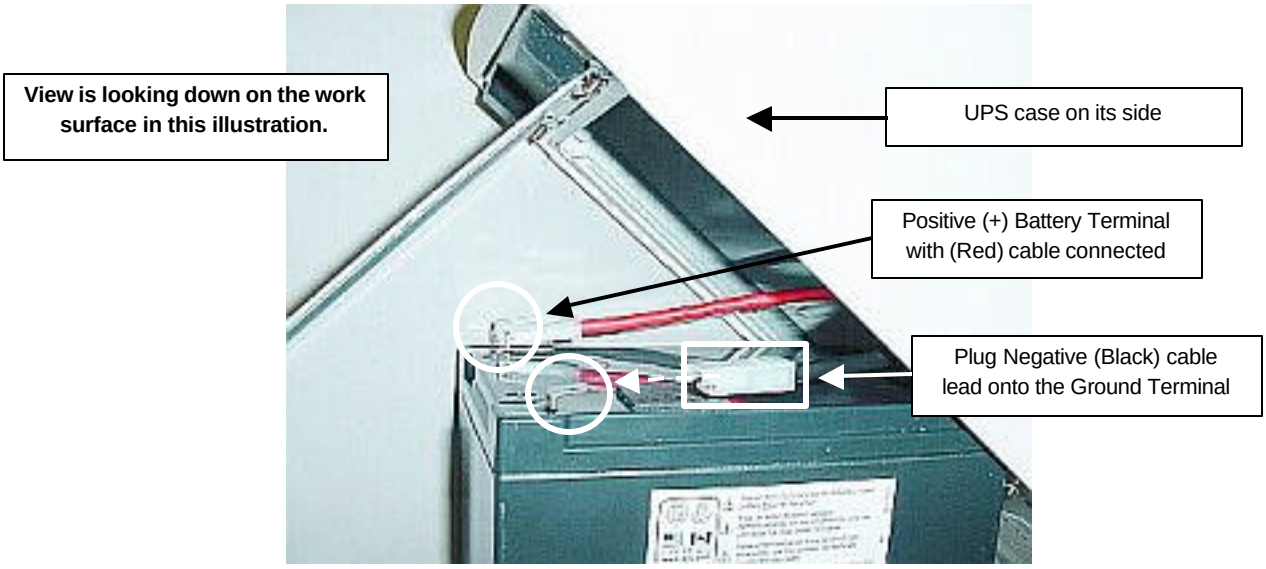


Fig. 196 - Connecting UPS Battery Cable to Terminal

5. With the UPS case on its side, with battery cover open, slide the battery out on its side as shown in Figure 196 above.
6. The red positive (+) cable lead should already be connected to the battery's positive ground terminal. (Refer to Figure 196) Figure 197 shows black negative cable connected to the ground terminal.
7. Connect the black negative (-) wire lead to the battery's negative (-) terminal. (Refer to Figure 196)

Fig. 197 - Domestic UPS with Battery Cables Connected

4.10.32 APC Back-UPS Model 650 (Domestic Model) (P/N 957-0060-02) (Continued)

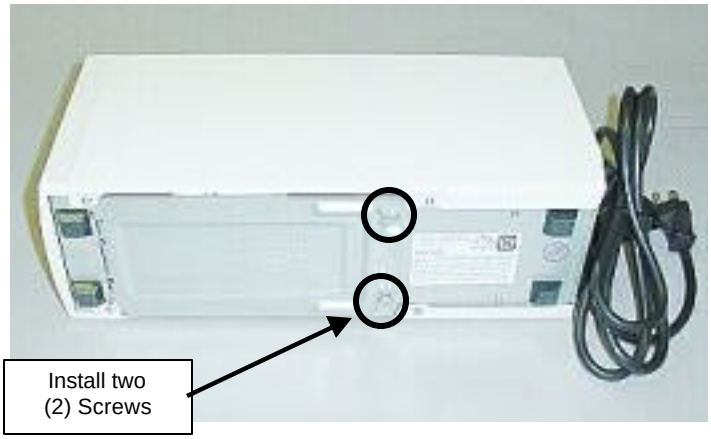


Fig. 198 - Domestic UPS with Battery Cover Secured

8. Secure the battery cover with two (2) screws and place the UPS in its permanent location. (Refer to Figure 198)

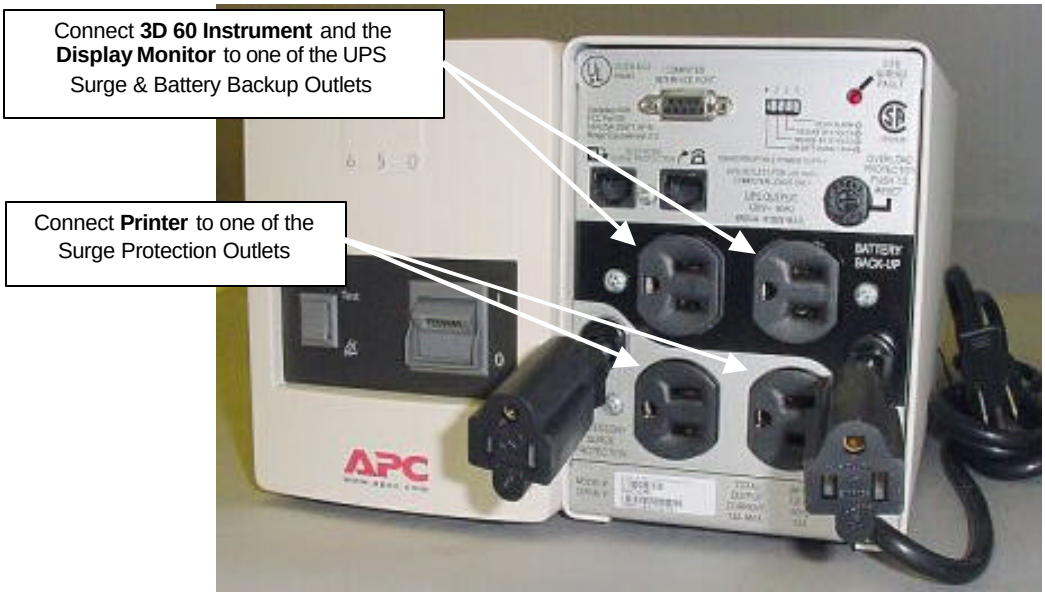


Fig. 199 - Domestic UPS Peripheral Connections

9. Connect the 3D 60 Instrument's power cord into one of the Surge and Battery Backup Outlets. (Refer to Figure 199)
10. Connect the Display Monitor's power cord into one of the Surge and Battery Backup Outlets. (Refer to Figure 199)
11. Connect the Printer's power cord into one of the Surge Protection Outlets. (Refer to Figure 199)

4.10.32 APC Back-UPS Model 650 (Domestic Model) (P/N 957-0060-02) (Continued)

12. Plug the serial UPS cable into the **Computer Interface Port** on the UPS and connect the opposite end cable into the **UPS** Port on the rear of the 3D 60 Instrument.
13. Plug the UPS into a facility AC receptacle rated for 120V and press the UPS power switch to **ON**. The Power-**ON** light will illuminate on the switch.
14. Turn on the Printer and Display Monitor.
15. Turn the 3D 60 to **ON** from the PEM's power switch on the rear of the instrument and wait for proper power up initialization and "*Main Screen*" to display on the monitor.
16. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
17. Annotate appropriate maintenance and logbooks.
18. Return the system to normal operation.

4.10.33 APC UPS (International Model) (P/N 957-0060-03)

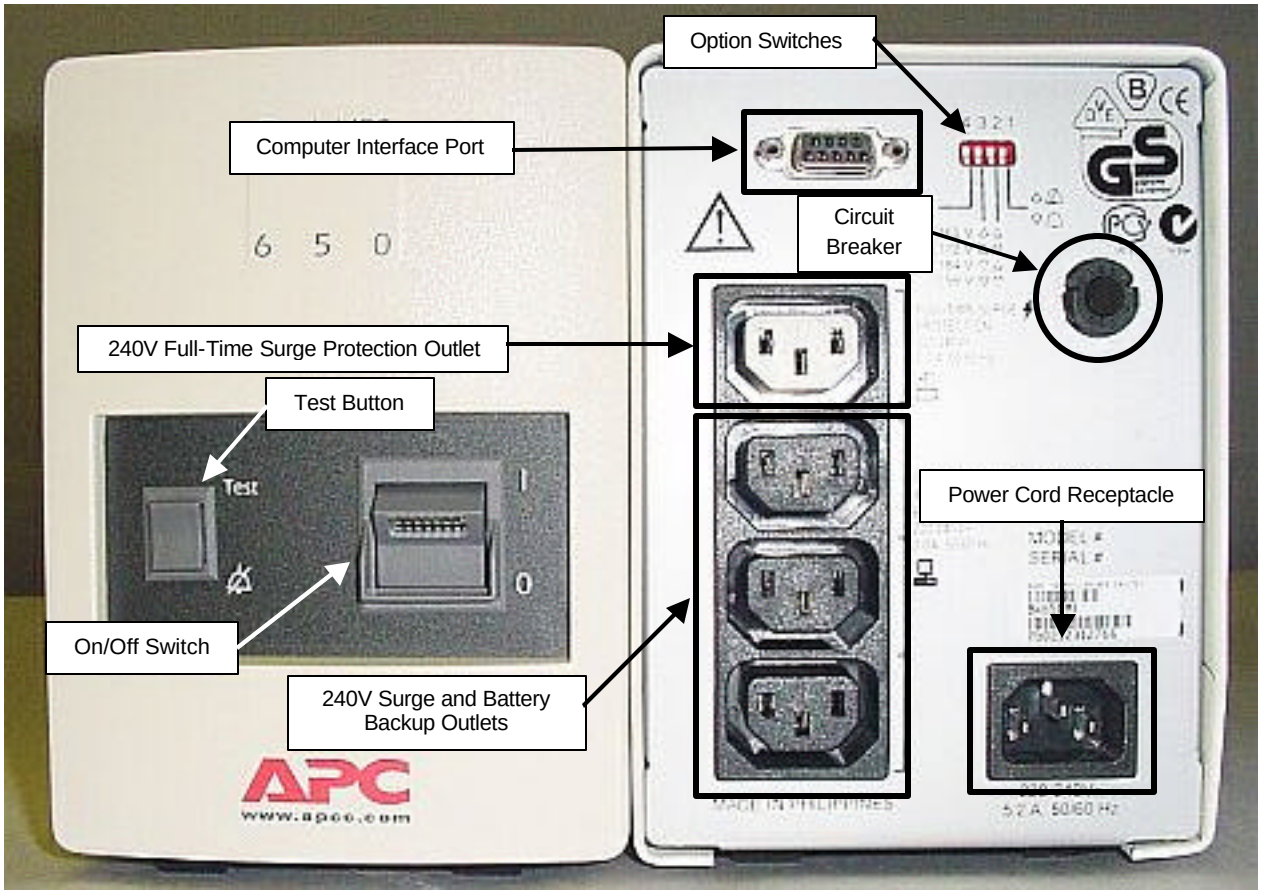


Fig. 200 - APC UPS International Model – Back-UPS 650 (240V) (Front and Rear View)

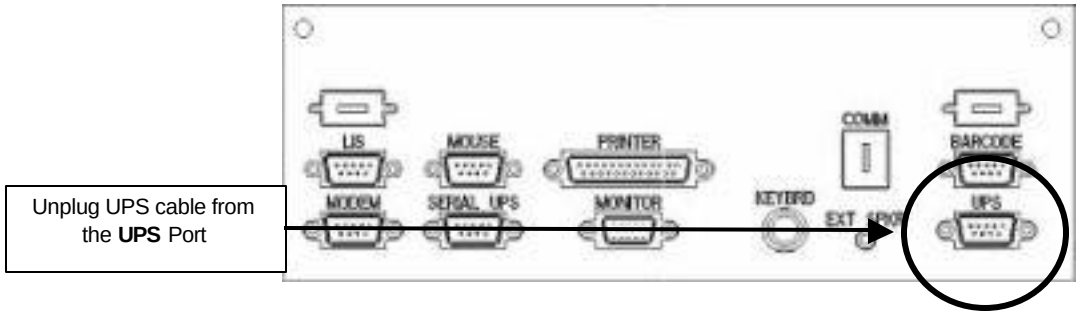


Fig. 201 - 3D 60 System Rear Communications Ports (UPS Cable Connection)

1. Refer to Subsection 4.3.2 and perform the 3D 60 Power Down procedure.
2. Unplug the UPS cable from the **UPS** Port on the rear of 3D 60 Instrument and the opposite end of the cable from the **Computer Interface Port** on the defective UPS. Set the UPS aside. (Refer to Figures 200 and 201)

4.11.33 APC UPS (International Model) (P/N 957-0060-03) (Continued)

Fig. 202 - International UPS Battery Connection Preparation

3. Unpack the new UPS from the box. (Refer to Figure 202)

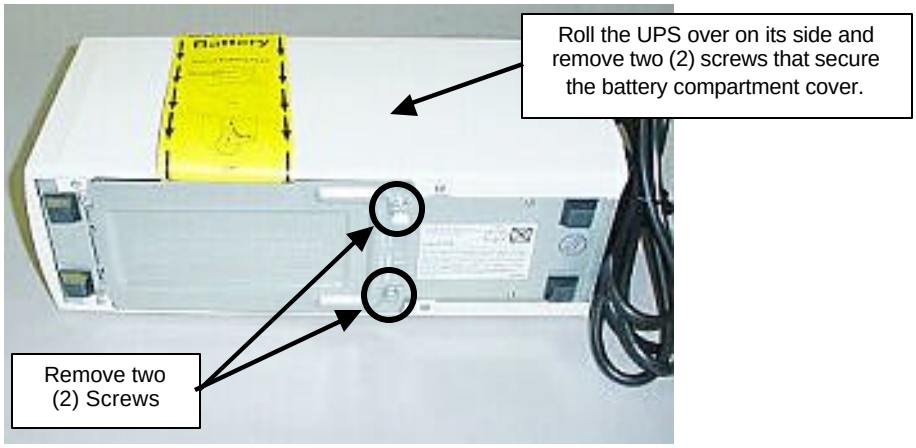


Fig. 203 - International UPS Battery Cover Removal

4. Lay the UPS on its side and remove the two (2) screws from the battery compartment cover. (Refer to Figure 203)

4.10.33 APC UPS (International Model) (P/N 957-0060-03) (Continued)

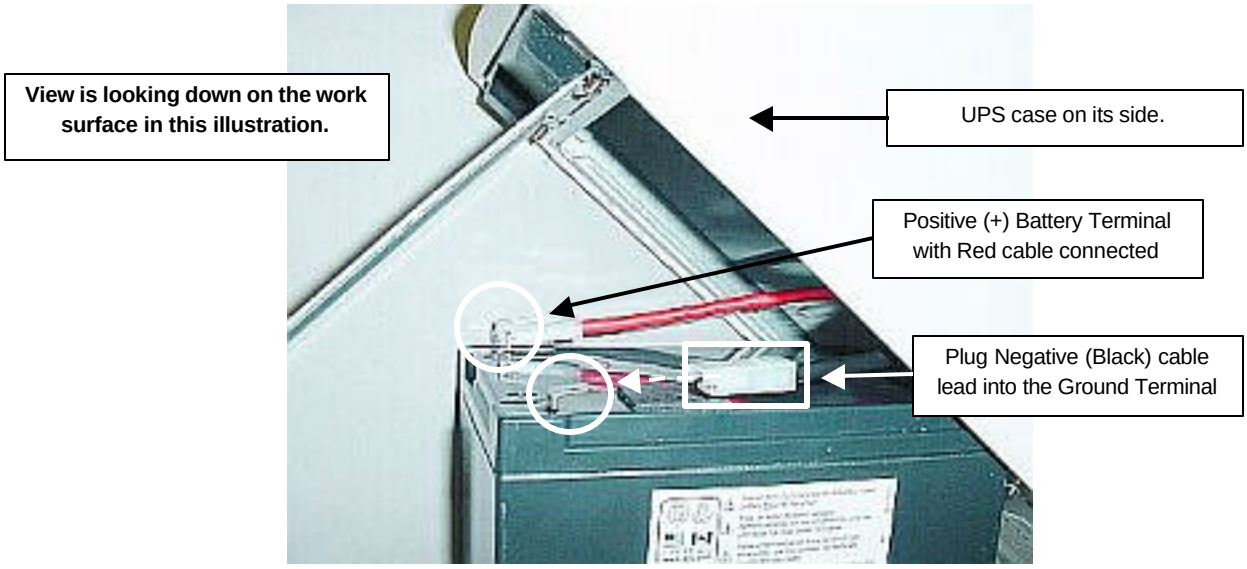


Fig. 204 - Connecting UPS Battery Cable to Terminal

5. With the UPS case on its side, with battery cover open, slide the battery out on its side as shown in Figure 204 above.
6. The black positive (+) (Red) cable lead should already be connected to the battery's positive (+) terminal. (Refer to Figure 204) Figure 205 shows the negative (-) (Black) cable connected to the ground terminal.
7. Connect the black negative (-) wire to the battery's negative terminal. (Refer to Figure 204)

Fig. 205 - International UPS with Battery Cables Connected

4.10.33 APC UPS (International Model) (P/N 957-0060-03) (Continued)

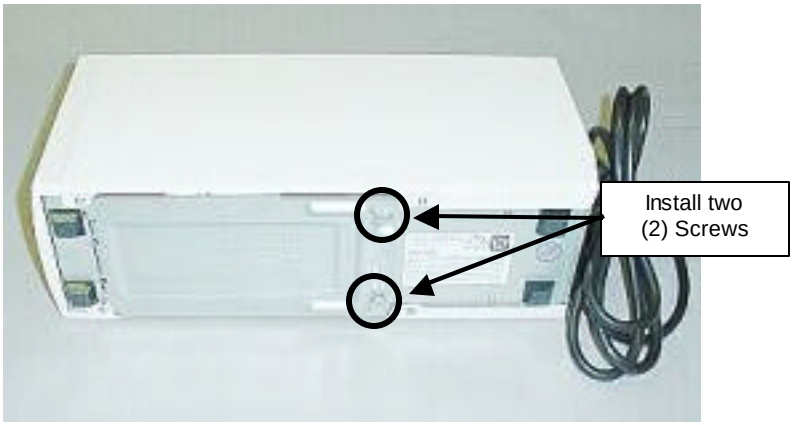


Fig. 206 - International UPS with Battery Cover Secured

8. Secure the battery cover with two (2) screws and place the UPS in its permanent location. (Refer to Figure 206)

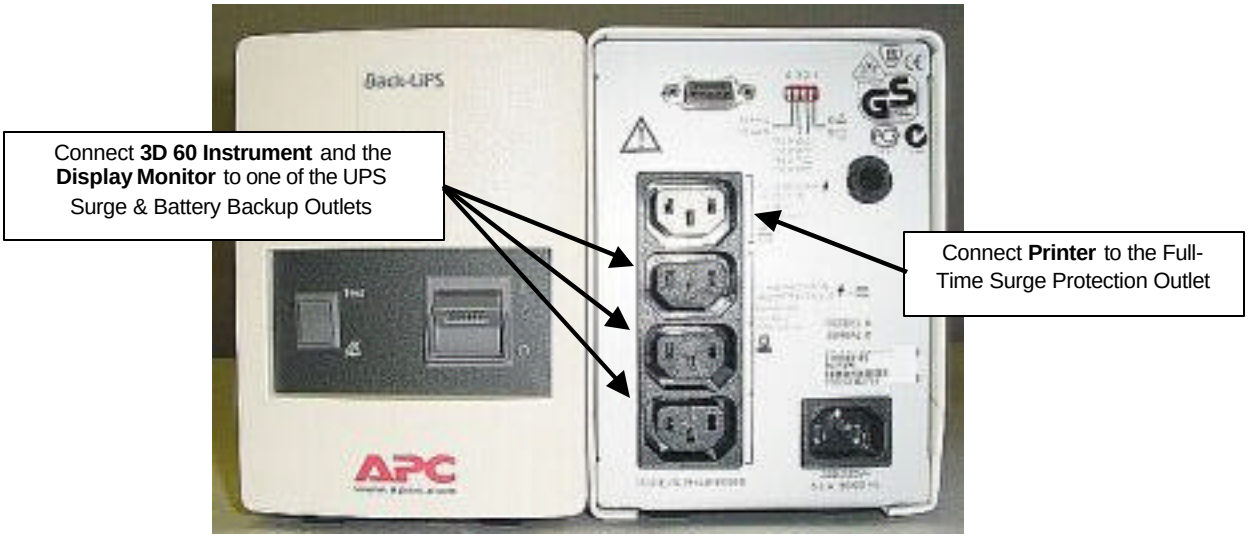


Fig. 207 - International UPS Peripheral Connections

9. Connect the 3D 60 Instrument's power cord into one of the Surge and Battery Backup Outlets. (Refer to Figure 207)
10. Connect the Display Monitor's power cord into one of the Surge and Battery Backup Outlets. (Refer to Figure 207)
11. Connect the Printer's power cord into one of the Surge Protection Outlets. (Refer to Figure 207)

4.10.33 APC UPS (International Model) (P/N 957-0060-03) (Continued)

12. Plug the UPS cable into the **Computer Interface Port** on the UPS and connect the opposite end cable into the **UPS** Port on the rear of the 3D 60 Instrument.
13. Plug the UPS into a facility AC receptacle rated for 240V and press the UPS power switch to **ON**. The Power-**ON** light will illuminate on the switch.
14. Turn on the Printer and Display Monitor.
15. Turn the 3D 60 to **ON** from the PEM's power switch on the rear of the instrument and wait for proper power up initialization and "*Main Screen*" to display on the monitor.
16. Refer to Subsection 4.11 and perform the Post Service Validation procedure.
17. Annotate appropriate maintenance and logbooks.
18. Return the system to normal operation.

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4.11 POST SERVICE VALIDATION

This chapter describes the equipment quality control procedures to be performed subsequent to maintenance operations.

4.11.1 Overview

This section provides the procedures for verifying the proper functioning of the BacT/ALERT® 3D 60 after a service call (repairs, alignments). They are not used after PMs or installations, as they are covered separately.

4.11.2 Required Materials

The following items are needed (as a minimum) to complete the validation:

- BacT/ALERT 3D 60 Instrument
- BTA3D Field Utilities ZIP™ Disk

4.11.3 Procedures

1. Verify that the internal temperature of the Incubation Chamber has stabilized and then verify that the displayed temperature on the display monitor is within ± 0.5° C of the calibrated reference thermometer. (Refer to Subsection 4.6.5)
2. Verify that the Barcode Scanner will load a bottle by using the [*Load Bottles*] function.
3. Unplug the UPS from the AC wall outlet and verify the audible alarm, emergence of the red triangle icon and the UPS alarm. Immediately plug the UPS back in.

> **NOTE**
> Try not to keep AC power off for too long. If the AC is allowed to remain off more than 1 minute, the 3D 60 Instrument will begin an orderly shutdown. If this occurs, the system will require rebooting.

4. **Press** <Esc> key and <Y>, <E> and <S>, followed by the <Enter> key.
5. Install the "BTA3D Field Utilities Disk" and execute "CAL1". Select [*DIAGNOSTICS*] and verify that the door switches are functioning correctly.
6. Select the [*TEMP*] settings to look at the Rack PCBA temperature sensors. Verify that they are reporting within tolerance. *Sensor readings should be within ±3° of the set point value*.
7. **Press** <Esc> twice to exit the utility program.
8. At the D:\ > prompt, **type** C: and **press** the <Enter> key.
9. **Type xbta3d** and **press** the <Enter> key.
10. Once the 3D program starts running, wait approximately 15 minutes and verify that there are no errors reported by the 3D 60 Instrument's Main Screen.

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APPENDICES

APPENDIX A - GLOSSARY

A.0 Glossary Listing in Alphabetic Order

A-D CONVERTER	A device that transforms analog electrical signals to a digital format.
ACCESSION	A sample collected from a patient during a single event.
ACCESSION ID	Synonym for 'Accession Number.'
ACCESSION NUMBER	A number that uniquely identifies the sample or patient specimen.
AGITATION	The rocking motion of the racks within the Incubation Chamber. Required process in order to produce the growth of Microbes.
AGITATION MOTOR	The device within the Incubation Chamber that produces agitation (Step-5).
ANONYMOUS BOTTLE	A bottle that has been placed in an Incubation Chamber without going through the formal bottle loading process. Bottles loaded anonymously must eventually be identified and assigned a bottle ID.
ASTM	Acronym for 'American Society for Testing and Materials'
AUDIBLE ALARM	The field technician sets the coarse adjustment of volume and frequency with the use of jumpers. Fine setting of volume specified by the user to flag positive bottles, instrument failure or an operator error.
BACT/ALERT®	bioMérieux's automated instrumentation to screen test specimens for the presence of microbes.
BACT/LINK®	BACT/LINK®
BARCODE READER	Used to scan accession numbers or bottle barcode labels and identifies bottles when loading or unloading.
BLOWER	Device within the Electronics Drawer that circulates warm air in the Incubation Chamber for the incubation process.
BOTTLE GRAPH	A line graph that plots the microbial activity in a blood culture bottle over time.
BOTTLE ID	Usually a barcode that uniquely identifies a single blood culture.
BOTTLE TYPE	BacT/ALERT® bottle with a specific type of culture medium (i.e.: BacT/ALERT SA).
BUTTON BAR	The user can freely move to any screen at any time by selecting ("clicking on and/or sliding") the appropriate button from the vertical column of buttons that are always visible on the right-hand side of the display screen.
CAUTION	A step or action that could easily result in damage to the instrument or create an incorrect result.

CENTRIFUGATION	A technique employing the quantitative application of centrifugal force. A centrifuge is a rotating device employing this technique and used for separating liquids of different specific gravities or for separating suspended particles in a liquid solution.
CALIBRATION STANDARD	Test rod used to calibrate cells. There are four separate standards (on two rods) used to calibrate the cells. Each standard is identified by the number of rings around the end of the standard.
CELL	Holds and monitors each culture bottle. Each cell is numbered from 1 through 60.
CELL FLAG	Secures bottles in cells. Aids in cell diagnostics and with bottle loading and unloading determinations.
CELL INDICATOR LIGHT	Illuminates to show the location of positive, negative or anonymous bottles, as well as to show where new bottles should be placed/removed. An indicator light is adjacent to each cell.
CHAMBER	The Incubation Chamber contains three racks (60 cells in total) for a total capacity of 60 culture bottles.
CHECK BUTTON	Icon on operator's screen used to accept an input or selection by the operator.
CLICK	Point the mouse to an item and then quickly press and release the mouse button.
CPU	Acronym for 'Central Processing Unit'.
CURSOR	A marker for the active site where input would be directed. In BacT/VIEW®, it refers to either the pointer position indicator (mouse cursor) or the text entry position (caret).
D-A CONVERTER	A device that transforms digital signals to an analog electrical format.
DATA SIGNAL DISTRIBUTION	Contained within the ModSig PCBA and routes all signals within the Instrument.
DC POWER SUPPLY	Device that produces the required DC voltages used within the Instrument.
DIMMED	BacT/ALERT® 3D 60 disables (dims or grays) user interface (i.e.: menu items, buttons, text fields) that are unavailable due to security restrictions or due to the current context of the software. Disabled user interface items are not selectable.
DISABLED	Describes a user interface item (i.e.: menu item, button, text entry field) that is not currently selectable by the user. Disabled user interface items are usually displayed in gray.
DOS	Disk Operating System (MS-DOS® is used).
ELECTROSTATIC SENSITIVE DEVICE	(ESD) Component that is easily damaged by static electricity. These components are usually associated with PCBAs .
ENABLED	The opposite of disabled. (See 'Disabled')

ESD	Acronym for 'Electrostatic Sensitive Device'.
EXECUTABLE	A software program that can be started from the operating system's command prompt.
EXTERNAL SPEAKERS	External devices typically used to produce alarm sounds remotely and connected via an external port on the rear of the Instrument.
FIELD	Refers to an area on the screen where variable text is displayed.
FIRMWARE	In computer terms, firmware is the internal software code that a system uses to operate.
GENERIC BOTTLE ID	A bottle ID that does not indicate one of the pre-defined bottle types.
GRAPHICAL USER INTERFACE (GUI)	A method of user/computer interfacing where the user communicates with the computer by manipulating graphical screen images.
GRAYED	See *DIMMED*. Refers to user interface items that are not selectable.
HEATER	Device within the Instrument that produces the required heat for the Incubation process.
HOSPITAL ID	Text screen that uniquely identifies a patient.
INCUBATION CHAMBER	The chamber within the Instrument that holds the racks and incubate BacT/ALERT® 3D 60 bottles.
INDICATOR LIGHT OR LAMP	An identifier for an indicated cell that lights up to indicate the location of a particular bottle or bottle type. They are located in the racks adjacent to the cells.
ISOLATION TRANSFORMER	Isolates and protects the BacT/ALERT 3D 60® from facility power.
KEYBOARD	Provides for an alternate means of input for bottle IDs, accession numbers, hospital IDs and names. Serves as a backup input device should the mouse or Barcode Reader fail.
LABORATORY INFORMATION SYSTEM	(LIS) Name for a customer maintained computer system (usually a mainframe) that collects information from laboratory instruments within the lab.
LCD MONITOR	A Liquid Crystal Display device that's used to display video images of software and firmware functions. Typically called Flat Panel Display.
LIS	Acronym for 'Laboratory Information System.'
METAL OXIDE VARISTOR	(MOV) An electronic device that provides inline surge protection for the internal circuitry of the Instrument.
MODSIG	A PCBA that serves as a control interface for data communications between all of the internal and external devices/peripherals of the Instrument.
MOV	Acronym for Metal Oxide Varistor.
MICROBE	Simply put, it's a Microorganism or germ.

MOMENTARY BUTTON	An Instrument display screen button, which remains activated (appears to be pressed) only as long as the corresponding screen area is being clicked.
MONITOR	A device upon which video images are displayed.
MS-DOS®	Acronym for Microsoft® 'Disk Operating System (DOS)'.
MYCO	An abbreviated term for Mycology, a branch of botany dealing with fungi.
MYCO CONVERSION	Incubation Module rack configuration designed to grow and detect Mycobacteria. This conversion disables the agitation processes and is not required for the bacteria growth.
NEGATIVE	Describes a culture bottle that has no evidence of microbial activity.
NOTE	Any step or actions that may need further clarification or explanation.
NVRAM	(Non Volatile RAM) Random Access Memory that is capable of retaining data when power is removed from the system. The BacT/ALERT® 3D contains NVRAM in the CPU PCBA, Module Controller PCBA, and the Rack Controller.
OPTION	A member of the set of possible valid entries for the current field.
PCBA	Acronym for 'Printed Circuit Board Assembly.'
PEM	Acronym for 'Power Entry Module'.
PM	Acronym for 'Preventive Maintenance.'
POP UP	Synonym for display screen dialog.
POSITIVE	Describes a culture bottle that has evidence of microbial activity.
POWER CONNECTOR	A fitting to attach the alternating current (AC) power cord.
POWER ENTRY MODULE	(PEM) Device on the Instrument that contains the fuse(s) and facility voltage selector. It also contains the power connector.
POWER PANEL	Panel within the Instrument containing the DC Power Supply, relays and isolation transformer.
PREVENTIVE MAINTENANCE	(PM) Routine maintenance procedures that are performed annually by the service technician. These maintenance procedures ensure proper operation of the instrument and help in reducing major outages.
PRINTER PORT	Printer interface port (parallel) on the Instrument that's for producing hard copy reports concerning bottle status.
PRINTED CIRCUIT BOARD	(PCBA) A fiberboard containing the necessary electronic components that are interconnected via soldered paths in order to create a working circuit assembly.

PROMPT	A text entry field that appears on a display screen. The primary purpose for a prompt is for data entry. Read-only prompts are not selectable and are dimmed. User entries into a prompt are checked for validity according to the value range internally assigned for that prompt.
QUAD SERIAL PCBA	PCBAs within the Combination Module that provide for the communication between the Incubation Module(s) and the rest of the system.
QUICK REFERENCE CARD	Outlines instructions for system operation and describes specific error codes. Found in the Operator's Manual and may be conveniently relocated by the customer.
RACK	Contains 20 cells, each of which can hold and monitor an individual culture bottle. Racks gently rock to agitate bottles, unless they are set up for MB.
RACK LEVELING BRACKET	Bracket on the rear of the rack assembly providing for a means of the agitation arm to make contact with the rack.
RAM	An acronym for 'Random Access Memory'. RAM is volatile memory (unless it is the special NVRAM in the BacT/ALERT 3D®).
REFERENCE THERMOMETER	See *THERMOMETER*.
SCROLL BUTTON	A button that allows selection of numerical or symbolic values by clicking arrows above or below a window that shows the selected character. While an arrow is being clicked, the center portion shows one character from among the available list of choices.
SELECT	To choose a screen option with a pointing device.
SLIDEBAR SWITCH	A rectangular icon device which moves between [*ON*] and [*OFF*] (symbolized by "1" and "0", respectively) when the corresponding end of the rectangle is touched.
THERMOMETER	An independent NIST-traceable temperature-monitoring device.
TOGGLE BUTTON	A button that becomes active (appears to be clicked) after the corresponding screen area is clicked, and continues to be active until it is clicked again.
UP/DOWN SCROLL BUTTON	Icon that is used to select a numerical value of "0" to "9". More than one button is available for larger numbers.
UPS	An acronym for 'Uninteruptable Power Supply.'
VIDEO BUFFER	Prepares video signals used on the operator's screen. Contains logic for the Backlight Inverter on the Touch Screen.
VIDEO INTERFACE	Interface between Video Buffer and the operator's screen.
WARNING	Identifies actions that can result in injury or death to personnel performing a procedure (or persons that may be nearby).
WAVEFORM	From the lab technician's perspective, this is another name for a bottle graph. For the field engineer it could mean either the same as above, or more commonly the picture presentation on an oscilloscope display.
ZIP™ DRIVE	Disk drive within the Combination Module providing for a means of loading software.

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APPENDIX B - PARTS LISTING

Parts in this list are either *"spares"* or *"shipped separately"* with the BacT/ALERT 3D 60 unit. For a list of parts shipped with the unit, see **Table 3.2.1 - 3D 60 Instrument Parts** on page 3-6 of this manual.

B.0 Alphabetical Listing of Parts

Adapter, Power 100-240 VAC	957-0004-384 (Shipped for International printer installations only)
Assy, Chassis (3D 60-Bare Instrument)	48100-901
Assy, Link, Agitation Drive	48406-1
Assy, Link, Bushing	48407-1
Assy, Link, Bushing, Short	48408-1
Blower Assembly	43107-1
Bracket, Gas Spring Mounting .73"	940-0113-01
Bracket, Gas Spring Mounting 2.06"	940-0113-02
Bumper, Foot	935-0022-08
Cable, Serial Modem (Optional)	957-0004-304
Cable, Rack	48203-1
Capacitor, Blower Motor	601-0001-02
CD Multilanguage	48001-1ML
Cflash Adapter MDL	957-0004-356
Cflash Base O/S	22173-3
Clip, Thermometer	940-0109-03
Cordset, Printer Euro 220V / UK 240V	866-0016-02 (Euro Only) / 866-0016-03 (UK Only)
Cover, Bottle Holder, 1-20 POS	43610-1
Cover, Bottle Holder, 21-40 POS	43610-2
Cover, Bottle Holder, 41-60 POS	43610-3
Decontamination Certificate	955-0227-01
Decontamination Procedure	955-0251-01
Drive, Zip, 250MB, IDE	895-0004-38
Fan	941-0009-07

Fuse, 6.3A	870-0008-25
Fuse, 5.0A	870-0008-24
Fuse, .5A, 250V	870-0008-14
Fuse, 1A, 250V	870-0008-17
Fuse, 3.15A, 250V	870-0008-22
Gas Spring Assy	926-0037-01
Grommet	935-0098-01
Heater	847-0009-01
Keyboard	957-0004-373
Labeling Set - WARNING, Anonymous BTL	955-0549-01
Link, Connecting	48418-1
Magnet	937-0005-18
Manual, Operator	48001-1
Modem, (Domestic)	957-0004-342
Modem, (International)	957-0004-364
Modem, Cable	957-0004-304
Monitor, CRT	895-0003-19
Monitor, Flat Panel	P/N Not Available
Motor, Stepper, 5-Phase	48104-1
Mount, Magnet, Assy, Rack, Motion Sensing	48423-1
Mouse	957-0004-372
MOV Assembly	43116-2
Offset, Round, Motor	48421-1
PC Speaker Set (117 VAC)	880-0002-01
PC Speaker Set (220 VAC)	880-0002-02
PCBA, CompactFlash Adapter Module	957-0004-356
PCBA, CPU w/o DOS & Memory	750-0070-01
PCBA ModSig	48300-901
PCBA, Quad Serial	750-0075-01

PCBA, Step-5	48301-901
PCBA, Thermistor	32300-1
Plate, Gasket, Rack	43611-1
Power Cord (100 VAC), (110 VAC)	866-0008-01
Power Cord (230/240 VAC)	866-0060-02
Power Entry Module (PEM)	805-0017-02
Power Supply, DC	852-0010-01
Printer, Parallel, Deskjet 5550, 120VAC	895-0001-943 (US AC Power Adapter included)
Rack Assembly 1-20	43147-921
Rack Assembly 21-40	43147-922
Rack Assembly 41-60	43147-923
Rack, Bottle Carrier BTA	940-0046-01
Relay, Solid State	845-0018-01
Scanner, Barcode	957-0004-291
Scanner, Stand	957-0004-346
Screw, 6-32 X ¼SCSNB, Thermometer Mtg	900-0137-28
Screw, ¼- 20 X 5”	900-0183-01
SIMM, 32MB, 72-pin	957-0004-340
Switch, Reed, Mag Prox Sem	841-0012-01
Switch, Thermal, Manual Reset	844-0010-02
Thermometer, Digital Dial	848-0004-01
Thermometer, Manual Reset	844-0010-02
Transformer	851-0015-01
UPS, 100 VAC (Japan)	957-0004-126
UPS, 120 VAC	957-0064-01
UPS, 230/240 VAC	957-0064-02
UPS Comm Cable	957-0004-353
Washer, ⅛ Flat	920-0006-11
Zip™ Disk	981-0001-11

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APPENDIX C - DISINFECTION PROCEDURES

C.0 Disinfection Introduction

This appendix contains detailed instructions on how to disinfect a unit prior to shipment. It also instructs on disinfection procedures of assemblies that may be replaced.

C.1 Procedures

WARNING
HANDLE SPECIMENS AND INOCULATED CULTURE BOTTLES AS THOUGH CAPABLE OF TRANSMITTING INFECTIOUS AGENTS.

C1.1 Spills

Any blood or test specimen spills within the unit need to be removed immediately. Procedures outlining disinfection for spills are in the BacT 3D Operators Manual.

C1.2 Instrument Shipping

Should the instrument require shipment to another location, perform the following procedure"

REQUIRED EQUIPMENT

- Gloves
- Cleaner
- Brush
- 5.25% Bleach
- Mask
- Decontamination Certificate
- 700PPM free chlorine solution
- 13 ML of 5.25% bleach in 1 liter of tap water

Table C.1.2 - Disinfection Equipment

- Remove and discard approved biohazard receptacle, all tubing and trays. Remove crusted materials, blood, reagents, etc. using a 700 PPM free chlorine solution (13 ml of 5.25 bleach to 1 liter of tap water) and brush.
- Dried and caked blood should be removed with a mild detergent and/or diluted bleach solution before disinfection.

C1.2 Instrument Shipping (Continued)

- Using disinfectant of 700-PPM free chlorine solution (13 ml of 5.25% bleach added to 1 liter of tap water), wipe down the exterior of the instrument. Pay particular attention to areas that are frequently touched.
- Place instrument in sealed plastic bag before packaging.

NOTE
Solutions of sodium hypochlorite (household bleach) are the recommended concentrations and have demonstrated to have broad-spectrum germicidal properties. Fresh dilutions should be used to prevent the loss of germicidal actions that occurs during storage.

C1.3 Assembly Shipping

Using the same equipment as mentioned in Table C.1.2, perform the following procedures on assemblies before shipping:

NOTE
The assembly decontamination procedure is inclusive of all assemblies returned to bioMérieux/St. Louis/IRC with the exception of printed circuit boards (PCBAs).

- Using 700-PPM free chlorine solution (13 ml of 5.25% bleach to 1 liter of tap water), wipe down all external surfaces of the assembly.
- After the decontamination procedure has been performed on the assembly, complete the decontamination certificate, noting any areas that were unable to be decontaminated. Attach the certificate to the assembly.

NOTE
Printed circuit boards (PCBAs) are not required to be decontaminated, however, the *decontamination certificate MUST be completed* noting on the certificate that decontamination was not performed.

- Place the assembly in a sealed plastic bag before packaging.

APPENDIX D - ERROR CODES

D.1 Error Codes

CAUTION

Failure to follow the procedures in this Service Manual or failure to attend to the fault conditions reported by the instrument within one hour may lead to invalid test results.

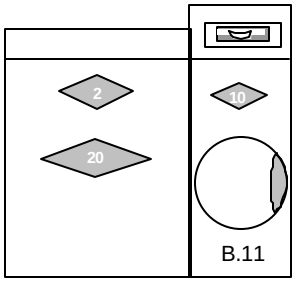
The following codes are discussed in this appendix.

1	43	72	913
2	44	73	921
3	45	74	923
4	46	75	930
6	47	77	931
10	51	78	932
11	52	99	940
12	53	710	941
19	54	800	942
20	55	810	943
21	56	901	944
22	57	902	945
39	60	910	960
41	62	911	961
42	71	912	

Note: If the problem cannot be corrected using the solutions listed or a code is displayed which does not appear in this list, call the Tech Support Center.

D.1.1 Instrument Fault Codes

Instrument Fault Codes appear in the Instrument icon. A description of each Fault Code is provided. The following is an example of an Instrument icon with Instrument Fault Codes 2, 10 and 20. Fault Codes are displayed on the particular components where the errors are located.



Note: Locate specific bottles with fault by clicking the Incubation Chamber on the **instrument** icon on the Main screen to display the "View Cell Status" screen.

Caution: Fault codes referring to loss of incubator temperature may adversely affect bottle testing and should be addressed immediately.

#1 Power Fault in Incubation Chamber

Cause: Fuse has been blown.

Solution: Contact bioMérieux.

#2 Communication Lost with Incubation Chamber

Cause: Internal cables may be loose or hardware problem.

Solution: Contact bioMérieux.

#3 Incubation Chamber Temperature Is Too High

Cause: The instrument optimal temperature (Set-Point) has been changed and has not yet equilibrated at the new temperature.

Solution: Wait for the chamber temperature to equilibrate.

Cause: Bottle testing may be adversely affected due to one of the following reasons:

- Hardware fault with the ModSig Board
- Hardware fault with the Solid State Relays that energize the heater.
- Faulty temperature sensors

Solution: Contact bioMérieux.

#4 Incubation Chamber Temperature Is Too Low

Cause: The instrument optimal temperature (Set-Point) has been changed and the Chamber has not yet equilibrated at the new temperature.

Solution: Contact bioMérieux.

Cause: The door has been left open or ajar for an extended period.

Solution: Make sure the door closes tightly and allow the chamber temperature one hour to equilibrate.

Cause: Bottle testing may be adversely affected due to one of the following reasons:

- Hardware fault with the ModSig Board.
- Hardware fault with the Solid State Relays that energize the heater.
- Faulty temperature sensors.

Solution: Call bioMérieux immediately.

#6 Agitation Stepper Motor Fault

Cause: Agitation Stepper Motor has reported a fault.

Solution:

1. Ensure AC power source is adequate or connect to an alternate power source.
2. The instrument runs on UPS power for 1 minute. If AC power is not restored during this time, the instrument and UPS turn Off. When AC power is restored the instrument will automatically reboot.
3. If power is not restored within an hour, it may be necessary to subculture bottles.

Caution Do not load or unload bottles until power is restored.

#11 Insufficient Charge in UPS

Cause: The UPS battery is low.

Solution: Call bioMérieux.

#12 LIS Communication Fault

Cause: The LIS is not responding to the instrument.

Solution: Check the LIS. The fault automatically goes away when communication with the LIS resumes.

Cause: The message from the instrument is not reaching the LIS.

Solution: Check the cable connections between the instrument and the LIS.

#19 Software Exception

Cause: A software exception has occurred.

Solution: Call bioMérieux immediately. System performance may be compromised.

#20 Door Open for Too Long

Cause: The door has been left open or ajar for an extended period.

Solution: Make sure door is tightly closed.

Cause: Door sensors have failed or become misaligned.

Solution: Call bioMérieux.

Cause: Fault in the ModSig board.

Solution: Call bioMérieux .

#21 Agitation Failure

Cause: Mechanical failure in the agitation linkage.

Solution: Call bioMérieux.

Cause: Agitation motor either disconnected or inoperative.

Solution: Call bioMérieux.

Cause: Fault in bottom rack.

Solution: Call bioMérieux.

#22 Unexpected Agitation

Cause: Instrument not configured properly.

Solution: Call bioMérieux.

#39 Rack Temperature Fault

Cause: The door has been left ajar for an extended period or there is a system failure.

Solution: Perform the following procedure:

1. Check the temperature in the Incubation Chamber.
2. If the temperature is high, there is a system failure. Leave the door open so the bottles will not overheat and call bioMérieux.
3. If the temperature is low, make sure the door is completely closed and wait 30 minutes to see if the fault goes away. If the fault does not go away, call bioMérieux.

#41-47 Rack(s) X Not Responding

Cause: Faulty rack controller or rack interface cable(s).

Solution: Call bioMérieux.

#51-57 Rack Hardware Failure

Cause: Faulty Rack printed circuit board.

Solution: Call bioMérieux.

#60 Cell Failed QC

Cause: A cell failed the automatic internal diagnostic check.

Solution: Perform the following procedure:

1. Identify the cell that failed the QC using the "View Cell Status" screen.
2. Inspect the cell for debris and remove or clean, if necessary.
3. Calibrate (*See Calibrating an Instrument Cell on Page 6.13 of the 3D 60 Operator's Manual.*) Get corrected Calibration Report if necessary.
4. If calibration cannot be performed at this time, or if a cell fails to calibrate, disable cell and insert an orange cell plug in the disabled cell. Call bioMérieux if cell calibration is unsuccessful.

#62 Erroneous Cell Load Status Reported

Cause: A cell is out of calibration.

Solution: Use the "View Cell Status screen (*See Viewing Faults on Page 3.4 of the 3D 60 Operator's Manual*.) to locate affected cells. Relocate bottle in affected cells using the following procedure:

1. Press <CTRL> + <F10> to enter a special 'Bottle Relocation' mode that allows bottles to be relocated. The cell indicator lights will illuminate in the following pattern:
   - Cells with bottles are lit continuously.
   - Cells available for reloading are unlit.
2. Pull bottles out, one at a time, and reload one at a time into any available cell.
3. If the bottle is anonymous (the **Bottle ID** field is blank), then enter the bottle ID (*See Text/Data Entry Page 3.6 in the 3D 60 Operator's Manual*.) When all bottles are unloaded, click the **Check** button on the "Main Screen".
4. Attempt to calibrate the cell (*See Calibrating an Instrument Cell on Page 6.13 of the 3D 60 Operator's Manual*.) Get corrected Calibration Report if necessary.
5. If the calibration fails, then disable the cell (*See Enabling and Disabling Racks and Cells on Page 6.10 of the 3D 60 Operator's Manual*.)
   - Insert an orange cell plug into the disabled cell.
   - Call bioMérieux.

Note: Call bioMérieux if error occurs with numerous cells. It could be a faulty Rack Controller.

#71 Invalid Time Stamp

Cause: Hardware failure involving the real time clock.

Caution Bottle readings are not processed while the fault is present.

Solution: Call bioMérieux.

#72 Invalid Calculation Data

Cause: Hardware failure involving the non-volatile random access memory.

Caution Bottles with fault are flagged positive and bottle readings are not processed while the fault is present.

Solution: Determine how long bottle readings have not been processed by going to the "Edit Bottle Detail" screen and noting the time of the last bottle reading (*See Viewing/Editing Bottle Data on Page 4.2 of the 3D 60 Operator's Manual*.) If the time passed is greater than one hour, bottles must be subculture.

1. Unload the affected bottle via the "Unload Positive Bottle" function on the Main screen.
2. Subculture the bottle if necessary.
3. Reload the bottle via the "Load Bottle" function on the Main screen. The original first loaded date and time is maintained.
4. If the fault code persists, call bioMérieux.

#73 Invalid Method Data

Cause: Important information used for bottle analysis has been corrupted and therefore bottle readings are not being processed. Bottles with fault are flagged positive one hour after the fault code first appears. Bottle readings are not processed while the fault is present.

Solution: Each bottle type uses the same method data. Eventually, all bottles of the same type as the one with the fault will also present the same fault code.

1. Reboot the system (See Instrument Shutdown/Startup on Page 6.6 of the 3D 60 Operator's Manual.)
2. Call bioMérieux.

#74 Algorithm Change

Cause: An incorrect media type has been previously assigned to a bottle. Bottles with fault are flagged positive and bottle readings are not processed while the fault is present.

Solution: Perform the following procedure:

1. Click the **Unload Positive Bottles** button and unload the affected bottles.
2. Subculture the bottle.
3. Reload the bottle via the "Load Bottle" function on the Main screen. The original first loaded data and time are maintained.
4. If the fault code persists, call bioMérieux.

#75 Bottle Data Corrupted

Cause: The data integrity check has found corrupted bottle data. Bottles with fault are flagged positive and bottle readings are not processed while the fault is present.

Solution: Perform the following procedure:

1. Click the **Unload Positive Bottle** button and unload the affected bottle.
2. Subculture the bottle.
3. Reload the bottle via the “Load Bottle” function on the Main screen to begin testing of bottle.
4. The original first loaded data and time is replaced with the data and time the bottle is reloaded.
5. The maximum test time is set to the default associated with the bottle type.
6. If desired, the bottle’s maximum test time may be shortened so that the bottle will complete testing when expected.
7. If the fault code persists, call bioMérieux.

#77 Reading Polynomial Change

Cause: An incorrect bottle type has been previously assigned to a bottle. Bottles with fault are flagged positive and bottle readings are not processed while the fault is present.

Solution: Perform the following procedure:

1. Click the **Unload Positive Bottles** button and unload the affected bottle.
2. Subculture the bottle.
3. Reload the bottle via the “Load Bottle” function on the Main screen to restart testing. The original first loaded date and time are maintained.
4. If the fault code persists, call bioMérieux.

#78 Incomplete Test Data

Cause: This fault occurs when an identified bottle is reloaded anonymously and later is identified and reloaded in the instrument. The original bottle data cannot be merged with the data collected when the bottle was anonymous and therefore the test data is incomplete. Bottles with fault are flagged positive and bottle readings are not processed while the fault is present.

Solution: Perform the following procedure:

1. Unload bottle with fault via “Unload Positive Bottle” function on the Main screen.
2. Subculture the bottle.
3. Reload the bottle via the “Load Bottle” function on the Main screen to restart testing. The original first loaded data and time are maintained.
4. If the fault code persists, call bioMérieux.

#99 Incomplete Test Data

Cause: A bottle is currently loaded in either:

- A cell that has been disabled, or the rack in which the cell is located is disabled.
- An enabled cell that is not taking bottle readings because of one of the following faults: 51, 52, 54, 60 or 62.

Bottle readings are not processed in faulty cells.

Solution: Use the "Edit Bottle Detail" screen to determine when the last bottle reading was successfully processed (*See Viewing/Editing Bottle Data on Page 4.2 of the 3D 60 Operator's Manual*.) If less than one hour has passed, it is only necessary to relocate the bottles using the following procedure:

1. From the Main screen, **press** <CTRL> + <F1>. This mode identifies cells containing bottles with 99, 51, 52, 54, 60 or 62 fault codes with a lit indicator.
2. Remove bottles from these cells, one at a time, and move them to cells whose indicators are unlit.

Note: If not bottle(s) are present in the indicated cell, call bioMérieux.

If more than an hour has passed, unload and subculture the bottle(s) in the faulty cells using the following procedure:

3. From the Main screen, **press** <CTRL> + <F10>.
4. Remove a bottle to subculture and scan the bottle ID. Repeat this step for the remaining bottles needing subcultures.
5. Click the **Check** button when done.
6. After sub culturing bottles, reload them via the "Load Bottle" function on the Main screen.

Affected bottles that do not need to be sub cultured should be relocated. Relocate bottles.

Note: If no bottle(s) are present in the indicated cell, call bioMérieux

D.1.2 Instrument Status Codes

Instrument Status Codes appear in a separate window on the Main screen and are identified by a 98 in the top left corner. A description of each Instrument Status Code is provided. The following is an example of an Instrument Status Code 710.

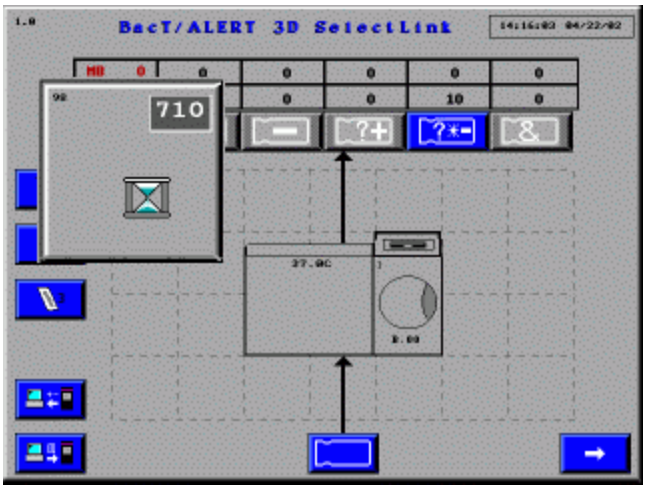


Fig. 208 - Instrument Status Code 710

#710 Incubation Chamber Temporarily Unavailable While Power Up Initialization Takes Place

Cause: Turning On the power of an instrument or clicking the **Restart Incubation Chamber** button invokes the “Power Up” screen to appear on the monitor. It is NOT possible to perform any action when the “Power Up” screen is present.

Solution: No operator action is necessary. The “Power Up” screen will disappear when the Incubation Chamber is ready. Do NOT load bottles while the “Power Up” screen is present.

#800 Printer Fault

Cause: The instrument was unable to print to the printer.

Solution: Check the following:

- The printer is powered on and connected to the instrument properly.
- The printer has paper.
- The paper is not jammed in the printer.

#810 Backup Failed

Cause: The instrument was unable to write backup data to the Zip® disk because the disk was either missing or defective.

Solution: Perform the following procedure:

1. Make certain there is a Zip disk in the drive and attempt a manual backup (See Initiating/Scheduling System Backups on Page 5.6 of the 3D 60 Operator's Manual.)
2. If this backup fails, insert a new Zip disk and attempt and manual backup.
3. If this backup fails, call bioMérieux.

APPENDIX E - DIAGRAMS

E.0 Diagrams

This section includes drawings or diagrams used for field service.

SCHEMATIC DIAGRAMS

1. System Wiring Schematic
2. System Interconnect Schematic

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